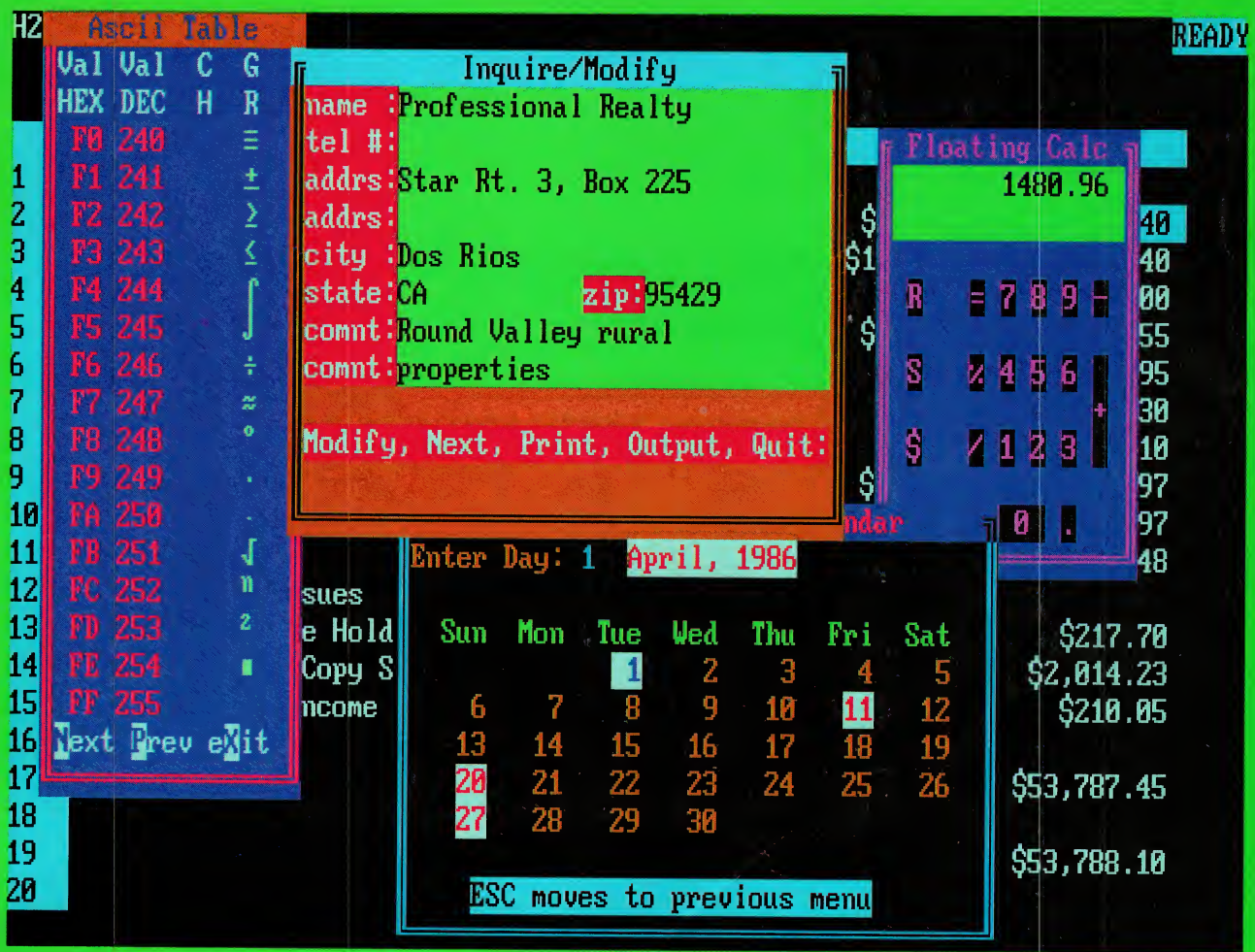
SEXTANT

New: C Users' Column

$2.95
January–February 1986
Issue No. 20

The Independent Magazine for Users of Heath/Zenith Microcomputers

Five Desktop Utilities for the Z100



Customizing muLisp for the '89 and '100

Palantir: Word Processing for any Heath/Zenith Computer

HERO on Patrol

Plus: Z100 Notebook • Index to Sextant *#1–#20*

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Now you don't need a video recorder to experience the excitement and suspense of *Wheel of Fortune* on your own time. DISCOVER is a takeoff on the TV show; the primary omissions in DISCOVER are the emcee and the wheel itself. But the game plays the same: you guess the letters that make up a phrase, or take a chance and guess the phrase. As long as you have someone to add new phrases for you, the game never wears out.

Features

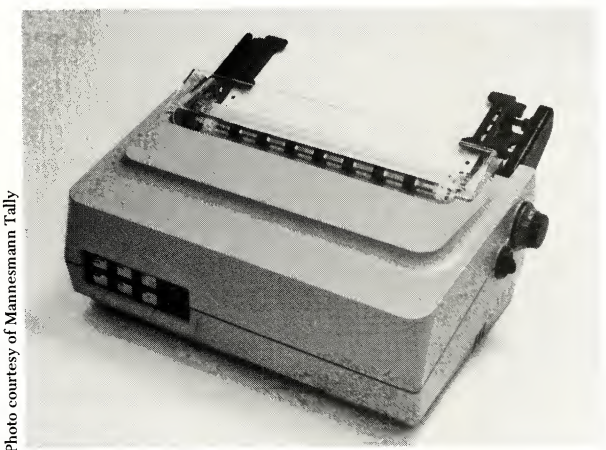

Photo courtesy of Mannesmann Tally

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Shopping for a printer is never easy. There are so many choices and tradeoffs: dot matrix or daisywheel, fast or slow, expensive or not-so-expensive. The MT-160L is a dot-matrix printer, but it can produce "letter-quality" output. It's also fast; and best of all, it's not so expensive.

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Photo by David R. Felstul

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How many school employees do you know who spend their spare time as lab instruments? At Mankato Area Vo-Tech there are two: the two robots used in the second year of the electronic-instrumentation and control program. When classes are over and the students go home, the HEROs stay behind for their appointed rounds. They roll down the hallways on the lookout for heat, light, and noise. They're not authorized to call the police or the fire department, but they report the nature and location of any problem to a human security guard, who checks things out and calls the proper authorities.

Departments

The Editorial Eye

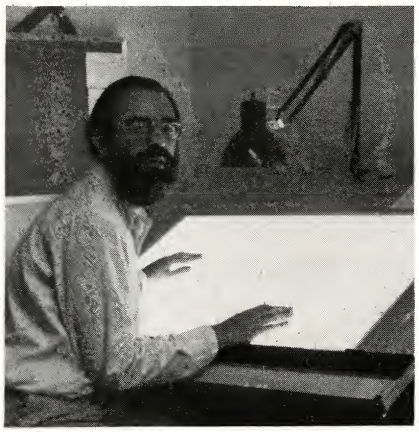

Photo by Jennie D. Allen

November turned out to be even busier and more interesting than I'd anticipated. I knew that several of us would be away from this office for CHUGCON 85 and the Western Regional HUG Conference. I also knew some of us would be attending a publishing conference in New York November 18-22. And of course I was aware we had to get this issue off to the printer. But I didn't fully anticipate the combined effect of these events, as accentuated by the myriad of little unanticipated snags that crop up consistently enough that we might have predicted them. Nor did I know I'd come down with a cold about a week before the Western Regional HUG Conference, despite the precedent of coming down with the flu a week before the 1984 conference.

CHUGCON provided several nice photographic opportunities. HERO Jr. found some little friends to play with and there were children in the vendor area showing off a game or two. It wasn't until after the conference that I discovered I hadn't got round to putting any film in my camera.

Not that the month was all bad. Jennie Allen, John Gill, and I were determined that this year we would get to see the HOLLYWOOD sign and visit Disneyland. We not only accomplished that, but also managed to get some good dessert. Driving along the Pacific coast up to Malibu, I found it interesting to see the signs announcing no life guard was on duty, and giving the phone number to call if you were drowning. For all I know, no one in Southern California goes swimming without a cellular phone.

November also turned out to be the month that people around here acquired computers. Our favorite consultant, Ron Pearson, bought a Z161 at CHUGCON. Bryan Rutberg won an H148 kit at dinner that night, and stayed up late enough to put it together. At the Western Regional HUG Conference two weeks later, Vickie Saxon bought a refurbished Z121 and Jennie Allen purchased a refurbished Z110. (Vickie will be telling you more about these two conferences later in 1986.)

Usually "The Editorial Eye" appears opposite an ad. I like to look at ads, and I like to see checks from advertisers going into our bank account. But it's a nice treat about once a year to be opposite the "Letters" department. I'd like to start off the new year with a few words about it. "Letters" is primarily designed to carry communications dealing with articles which have appeared in *Sextant*. The more directly a letter bears on the subject matter of an article, the better chance it has of being printed.

I don't regard "Letters" as a forum for general reader communication with the Heath/Zenith community. For that, Sextant Publishing Company provides *Buss: The Independent Newsletter of Heath Co. Computers*. As a general communications medium, *Buss* has the advantage of taking about one-third as long as *Sextant* to spread the word. I admit, it goes to only about one-third as many people. But it's there for anyone who wants to take advantage of it. If you're not reading *Buss* regularly, I'd be happy to send you a free sample.

Charles Floto

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Charles Floto
Editor
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Edward A. Byrnes
Contributor

Joseph Katz
Contributor

Alison Phillips
Contributor

Subscription Service • 202/544-0900
Advertising Inquiries • 202/544-2868
Authors' Inquiries • 202/544-2867
Charles Floto • 202/544-0484

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Letters

WordPerfect—Closer to Ultimate?

Kenneth W. Daniel's "Quest for the Ultimate Word Processor" (*Sextant* #18, September-October 1985) seemed more like an extended plug for WatchWord. I don't really have anything against that—I'm sure WatchWord is an excellent program, I've heard good things about it, and I also like to support independent developers of Heath/Zenith software. I just don't think he did justice to a program that in my experience is much closer to the ultimate Z100 word processor: WordPerfect 4.0. What really bothered me was that the article said so little about WordPerfect, mostly complaining about the scrolling. In contrast he dealt at length with an admittedly archaic program—PeachText. After using that program (the first I had for my Z100) for some complex formatted documents, *trying* to get decent proportional printing out of it, and going nearly blind and crazy trying to proofread documents cluttered with control codes, I feel he was more than charitable to it. The final straw was the description of PeachText as "very friendly, and no problem to teach to novices." This is certainly inconsistent with Ken's accurate description of the miserable manuals, and bumps right up against one of the greatest strengths of WordPerfect: ease of learning (thanks to an excellent manual and a well done keyboard template) and transparency of operation, coupled with powerful features. WordPerfect has features that satisfy nearly every one of the desires listed at the end of the article—a few of which were missed, such as word count (just run a spell check—don't worry, it's fast—although I can't blame any old PeachText user from avoiding speller operations; I'm still trying to get over that!), and most of all an "undo" command.

The recent enhancements announced in version 4.1 (multiple columns shown on screen, sorting, etc.) are just icing on the cake. The problem is I probably won't see them any time soon, if ever, for the Z100. I'll have to get the IBM version, and an emulator board if the HUG emulator program doesn't work, and *then* I'll be stuck with the much-harder-on-the-eyes IBM screen. (Incidentally, I'm looking at this in cyan letters on a black ground, with the boldface in yellow and the underlining in reverse video of the appropriate color—and control codes are *only* seen when I *ask* for them.) If Zenith Data Systems was supporting SSI's WordPerfect instead of Microsoft's Word or Micropro's older WordStar, the scrolling would be even better than the PC version and I could expect a very reasonably priced update coupon in the mail any week now. Maybe the government market will lure SSI into supporting the Z100.

As a government manager I hope so for one very important reason: ease of learning. There is a very rapid turnover in the GS-3 and 4 level positions most clerk-typists have. When you may only have an employee a year, you don't want to spend a lot of that time while they learn to use the fancier features of WordStar or Word. I've tried out WordStar (and use the Turbo Pascal editor which is reminiscent of it) and read through their manuals. There's a thriving business in writing books about how to use WordStar—there must be a reason! I must admit it's not the worst, by far. Just watch someone trying to revise some text in IBM's System 38 Text Management program, or the older Z-Word (no relation, I think) on the same machine. Then read the manual and try it yourself! IBM's manuals make MicroPro's look the model of clarity. Next spend a few hours with WordPerfect. Imagine how easy it would be to set up an assortment of format macros, how quickly forms typing would go with the merge from screen feature, and how easy it would be to teach yourself or anyone else to efficiently handle a wide variety of correspondence in just a few days' time. Yes, most of the functions *can* be done from WordStar or Word, or even IBM's Display Write 3, but if WatchWord is a sports car—of the Austin-Healey Sprite variety—then DW3 is a '65 International 3/4-ton pickup, and WordPerfect's an Alfa Romeo Spider: quick but not noisy, handles easily, and comfortable for the long haul. The comparison falls down at the next point, however: Alfa won't upgrade you to next year's model for 10% of a new one!

If all the foregoing sounds to you like I think I've found the "ultimate word processor," you're not far wrong. As it stands, the Z100 version of WordPerfect is very good. It could be better, and I'd hate to miss out on all the enhancements SSI will undoubtedly continue to come out with. For now I don't think you can find better, especially at the common mail order price of $195 or so. I hope either SSI or ZDS will see the light, but in the mean time, I can't wait to see what the FAST-IO patch and a faster clock speed will do for the screen refresh.

Steve Caple
Sacramento, CA

Better Clock Board

I built the real-time clock project in Issue #17. [See "Build Your Z100 a Real-Time Clock," by Richard H. Hirsch.] I would like to suggest that schematics for future construction projects be placed on a single page, so that they can be photocopied for use by the builder. By the time I was through redrawing the two project schematics, I had completely eliminated IC3 by wiring up the unused NAND and NOR gates! In addition, if the project is wirewrapped a wirewrap table should be printed.

I also squeezed everything onto half of the project board. This will allow another small project to be added later. These boards are $20 each, and I'm cheap!

I must be a better technician than I thought, because even with my modifications and a two-year absence from wirewrapping, my board worked the first time I inserted it. My software skills are lagging somewhat, because I made two small errors when typing in the project programs. But everything was working within a few hours. I note that the clock seems to lose a few minutes each week, but my needs aren't critical.

Thanks for the clock board, and I look forward to seeing more construction projects in the future.

Michael A Schulsinger
Springfield, OH

Editing VAX Files With Magic Wand

I found Alison Phillips' comments on editing WordStar files with Peachtext (*Sextant* #18, September-October 1985) very helpful. I use Magic Wand on my H89, and needed to get rid of carriage returns from VAX files I had downloaded from our college's mainframe computer. His method worked. I am writing this note to add a few suggestions for others who might be in the same situation as myself.

In VAX files prepared with Edit, all the end-of-line carriage returns are preceded by a space, while those you put in at the end of a paragraph are not. This fact allows you to get rid of them all at once by a global search and destroy, without deleting the end-of-paragraph carriage returns. (Simply press the find key, then the space bar and tab keys, then the find key twice more, followed by RETURN.)

Now, because of the spaces at the ends of lines, there will be some unusual spaces between words in the resulting reformatted paragraphs. To get rid of these you can use the following stratagem: press the find key, then three spaces with the space bar, then the find key twice more and RETURN. This preserves the single spaces between words and the double spaces following periods, but closes up any gaps larger than that.

So far I have not been able to get files to transfer very well in the opposite di-

rection. What I need is a way of inserting carriage returns at the ends of lines, but without including line feeds at the same time. At present, if I try to print on the college printer a file already printed to disk, the college printer adds its own line feed to the one that is already there. Single-spaced text becomes double-spaced, and underlines print on a separate line. Maybe here it is a question of choosing a different printer configuration from that for my own printer, but the Heath/Zenith version of Magic Wand is quite limited in its offerings in that respect. Any suggestions?

Paul Riesman
Northfield, MN

Awful Covers

I read with amusement your conclusion in the September-October issue of *Sextant* that the magazine's cover was rated by your readers to be penultimate in importance out of a fourteen-item list. I have little doubt that this is an accurate assessment of the taste of your current readers, since with *Sextant*'s covers anyone who would pick up a copy can't be too concerned with the external appearance of the magazine. I don't mean to imply that *Sextant*'s covers are bad—I mean to imply they are awful. A magazine cover needs visual impact to be a successful selling tool. Also, a good cover adds an air of professionalism which a magazine of *Sextant*'s caliber deserves. There is certainly nothing unprofessional between the covers of *Sextant*. So why should the cover look like an imitation of a 1950's Russian farm-implements journal?

With a better, more eye-catching cover you may find more people buy and subscribe to your magazine. They may not admit that the cover is important to them, but you'll be able to see it in your circulation. And I'll be able to put the magazine on my coffee table when company comes.

Stephen W. Watkinson
Phoenix, AZ

More Disk Capacity

I must express some disappointment in Raymond Dotson's article, "More Disk Capacity for Your '89," which appeared in issue #19.

My disappointment stems from the fact that Ray's installation of DS/DD floppy drives in the '89 ignores several important points that he, being a Zenith Data Systems dealer, should certainly know. Heath's original Z89-37 double-density controller package included new and more powerful +5 and +12 volt regulators (as well as additional heatsinks) that allow the '89 power supply to output 5 amps instead of the original 4 amps; otherwise, the heat buildup becomes so intense that you will burn out your regulators.

A further modification (that Heath has been promoting since the latter part of 1982) is the removal of the orange wires from P103 to the bridge rectifier, then cutting the yellow transformer leads from P101 and soldering them directly to the bridge rectifier. This eliminates a potential source of in-circuit heat buildup and eliminates burning out the yellow wires, a common problem with older '89s.

The Teac 96-t.p.i. drives (model 55F) each draw about .70 amps. The Z89-37 controller draws .50 amps. The CPU board, .94 amps; the terminal logic board about 1.17 amps. So, without any additional board installed, we have already consumed 4 amps of the '89's power output. Plug in the H88-3, the H17, and the H88-18, and you're up to 4.5 amps. Additional cards will push you over the 5-amp limit. Yes, there is some electromagnetic interference involved with high-density drives, and you should use a mu-metal shield that completely encases these drives on all four sides, rather than modifying the shield that housed the original H17 drives. Floppy Disk Services of Lawrenceville, New Jersey, can probably supply this item, as they sell twin drives for mounting inside the '89.

As to the reliability of 96-t.p.i drives, especially the Teac 55F, I have had no problems whatever in two and a half years. They are among the best drives made. As to disks, quality standards being what they are today, I have used cheap single-sided, single-density 48-t.p.i. disks and formatted them for double-sided use in quad-density format, and they have worked as well as the overpriced Dysan disks. Believe it or not, Dysan does *not* make its own disk media; nor do a lot of other brand names. They are purchased from generic disk manufacturers, then dressed up in fancy jackets with colorful labels, so that they qualify for premium prices.

Insofar as getting 96-t.p.i. drives (as well as 48-t.p.i. DS/DD drives) with CP/M and HDOS, Heath's CP/M releases 2.2.03 and 2.2.04 allow the user to configure the BIOS for these drives. Heath also provided a free update for HDOS called HOS-5UP that included a new device driver called DK.DVD, plus other utilities.

I hate being picky, but I feel that an article dealing with a hardware modification should have been researched a little more carefully. As it is, I have only touched on the more glaring omissions. I haven't mentioned that most half-height drives are approximately a half-inch longer than the standard H17 drive, and you will have to bend the heatsink fins in order to slide the new drives all the way in.

Peter Ruber
Oakdale, NY

More on Disk Capacity

I enjoyed the fine article "More Disk Capacity for Your '89" by Raymond Dotson (*Sextant* #19). Articles like this help to instill the confidence kit builders need to tackle modifications that seem complicated but are shown to be relatively straightforward. I wish the article had appeared earlier; it probably would have saved me having to pay a large New Jersey distributor an exhorbitant premium for a "kit" that consists of no more than the components described in the article.

Two considerations should be added to those described in the article:

1) The installation of dual internal drives "doubles" the load on the H89 power supply; in my case this proved to be "fatal." I subsequently purchased a dual external enclosure and power supply in accordance with the original H89 design for the expansion of disk capacity.

2) Compatibility with almost anyone else in the world is sacrificed in any disk expansion that perpetuates the use of a hard-sector format. When a soft-sector controller is used with 40-track disks (either single- or double-sided) the format is still somewhat unique to the H89; but when this combination is used, programs are readily available (e.g., those from Computer Consultants to Business) to read/write the formats used by the IBM PC, the Z100, and a host of other computers that use this standard.

William Derby
Livermore, CA

HDOS Anything But Outdated

I was pleased to see the articles in the November-December 1985 issue of *Sextant* covering "HDOS: A Software Clock and Other Enhancements." Everyone is rushing out to buy the "wonderful" Z-dash systems (Z100, Z151, etc.). And more and more Heath-type user magazines are dropping articles on the H8 and H89 for articles on the Z100; and enhancements for HDOS systems for "exciting" MS-DOS and CP/M available to the Z-dash users. So what is happening to the old discarded H8 and H89 systems? I am sure that they weren't tossed out with last year's phone books and Christmas trees. There must be an awful lot of H8 and H89 owners that don't intend to ever give up their systems. I am one for certain.

SigmaSoft and Systems in Texas has a fantastic interactive graphics/pseudo-disk/spooler that can go into either an H89 system or an H8 system using a Z19 data terminal. [This was reviewed in *Sextant* #18; see "A Look at SigmaSoft's Interactive Graphics Controller," by Kenneth A. Patrick.] By adding this board to my H8/Z19 system, I have the ability to create applications for my H8 that I never thought I could. Trionyx Electronics in Southern California has helped me upgrade to a Z80 system capable of running at 4 MHz, a 64K board that is expandable to 256K, a side fan panel, and a universal disk driver board that will drive just about anything. Both companies are putting out hardware and software for the H8 that can expand the system almost every way possible and

they have only just begun. They also back up their hardware and software with fantastic personal support (when needed).

I have an H8. I am running both soft-sectored drives and hard-sectored drives on it. I have a Z19 terminal with the SigmaSoft and Systems IG/PD/SP board and an Epson MX-80. I can run both HDOS and CP/M software on this fine machine. I prefer HDOS and have just heard that HDOS 3.0 has been developed. I can't describe to you how excited I am about that. I love my H8 and have no intention of dumping it for any other system.

Please, do not write us H8/H89 users off. I am sure that there are a lot of us out there. Please continue to provide us H8/H89 users with news and articles for our great and anything-but-outdated systems.

Phillip Marlan McCrum
Brea, CA

RAM Drives for the '100

I recently purchased an H100 with 768K on the motherboard, so I really appreciated D. C. Shoemaker's article "RAM Drives for the '100" in the November-December issue.

Until I read the article, I didn't realize a RAM disk was available for CP/M-85. I just purchased RAMDRIVE/85 from J. J. Thompson and am very pleased with it.

Some of your readers might be interested in further information about MDISK.DVD for use with MS-DOS Version 2. As Shoemaker points out, the device driver as supplied limits you to creating one or more 64K segments, that will each act as an electronic disk. However, if you obtain the MS-DOS Version 2 Programmer's Utility Pack (CB-5063-16), you get a driver that allows the disk size to be specified in the CONFIG.SYS file, which I have found to be a tremendous improvement. Finally, if you want the size to be 512K or greater, you should check Dave Brockman's note on page 4 of *Buss* #112.

Thanks for a fine magazine.

Robert T. Cobb
Horseheads, NY

P.S. How about an article comparing the five resident utility packages for the '100? *[See page 6 of this issue.]*

Rewriting DIRECT.SYS

Sextant Issue #19 provided the usual good articles, along with some (also usual) food for thought.

Rick Streeter's letter about "patching" DIRECT.SYS was helpful and interesting, but may have left the wrong impression. Whether you change a file's flags with FLAGS, UDUMP, SDUMP, Pat Swayne's SFLAGS program, or anything else, you are by definition rewriting DIRECT.SYS. Similarly, any time you create (or extend) a file, updating the directory means that DIRECT.SYS will be rewritten.

By the way, for anyone who was inspired to go back and read Pat's SFLAGS article in *REMark* #28, the reason PATCH has the /DISP (displacement) switch is solely for the purpose of patching the first overlay file, HDOSOVL0.SYS. This file's program code begins precisely at the halfway point in the file, because the first half is used as temporary storage for the memory that HDOSOVL0 overlays. HDOSOVL0.SYS is, to the best of my knowledge, the only HDOS program file with this unique characteristic.

Charles Horn's article on an HDOS software clock was quite nice, and is a good way of getting some use out of the "hole" in the HDOS 2.0 memory map. There are, however, two problems that the user should consider:

First, any software clock working off the TICCNT 2-millisecond timer interrupt depends on that interrupt actually happening every 2 ms. This will not be the case any time a device driver (or a program) disables interrupt processing. In particular, the H17 driver does this for its own timing purposes. A compensation factor can always be added, based on the "average" amount of time that interrupts are expected to be disabled, but this is an average only. A large number of H17 disk accesses, for example, will cause the clock to run slowly, while running a program with few disk accesses will result in a faster clock.

(This is one reason why machines now use a timer chip like the 8253-5 Programmable Interval Timer, which will store up its "ticks" any time each tick is not serviced immediately.)

The other potential problem lies with the screen output routine. HDOS is normally set up to handle "word-wrap" any time characters will extend beyond the 80th column, and therefore must keep track of the screen column position at all times.

The cursor's column position is kept in a storage location call S.CURSOR, and the clock program rightly forces a "1" into it before displaying the time, just in case the characters in DISPLAY would cause a word wrap. Unfortunately, the program as published will leave HDOS with an incorrect cursor position when the time display exits.

One way to solve this is as follows.

At the end of the program, following the storage definitions for PARAM and INDEX, put in the lines shown in Listing A.

Then redo the SCOUT routine as shown in Listing B.

One final thing—since there is only 1K of space available for this routine, you may wish to check that these (or any other) additions will not exceed this limit. Right at the end of the source code, just after the definition of BYTES, put in this:

```
        ERRPL   BYTES-1024
```

This will cause the assembler to flag an error if the value of bytes is more than 1K. The number that the assembler will put at the left side of this line will tell you how far over the limit you have gone.

Unfortunately, I'm not really interested in using this program myself. My computer room has two Hayes Chronographs, a GC-1000 Most Accurate Clock, and I wear a wristwatch. So I don't see a great need to have the time jumping out at me from a terminal screen, too. (In fact, I've set up one Chronograph to display the date.)

What would be interesting is a follow-up article on how this program could be modified for the purpose of letting other user-written programs access the time. In other words, put the "HH:MM:SS" bytes in a fixed location and show some routines in MBASIC, FORTRAN, etc. that would access these characters when the current time is needed in a program.

As I said, food for thought.

Al Heigl
Minneapolis, MN

Correction

Due to a printer ribbon problem, some of the listings appeared incorrectly in "BASIC Questions and Answers," in the November-December issue of *Sextant*. In Listings 2-7, all of the commas came out looking like periods. The only periods should be in some PRINT statements.

```
P.CUSOR   EQU  *-OFFSET
          DS   1              Program storage for cursor pos.
```

Listing A.

```
SCOUT     EQU     *-OFFSET
          LDA     S.CUSOR       Get cursor position
          STA     P.CUSOR       Save it
          MVI     A,1
          STA     S.CUSOR       Force cursor report to column 1
SCOUT1    EQU     *-OFFSET
          MOV     A,M
          INX     H
SCOUT$    EQU     *-OFFSET
          CALL    *             The .SCOUT SCALL routine in HDOS
          ANI     200Q
          JZ      SCOUT1
          LDA     P.CUSOR       Get original cursor position
          STA     S.CUSOR       Put it back where you found it
          RET
***       THE CLOCK INTERRUPT ROUTINE . . . , etc.
```

Listing B.

Software Roundup: Five Desktop Utilities for the Z100

These memory-resident utilities let you take notes, do calculations, and look up appointments from within another program.

David R. Felstul

In the past, the computer has been used for handling the complicated stuff in the office—typing error-free letters and manuscripts, number-crunching in large spreadsheets, and sorting through long mailing lists. For simpler tasks, you still used a scratch pad for jotting down unformed ideas, a calculator for balancing the expense account, and an address book for associates' phone numbers. Your computer's 64 kilobytes of random-access memory (RAM) were just too valuable to waste on such trivialities.

As computing power has continued to come in ever smaller and cheaper packages, however, the tasks it is used for have also become smaller. Now, you too can have that vast expanse of uncluttered mahogany desk that looks so imposing in all those corporate offices. (Or at least you won't discover that today's appointments are a muddy blur from the coffee spilled on them last week.)

Desktop utilities, applications managers, or memory-resident programs—whatever you want to call them, these programs that help you get organized are some of the hottest software on the market.

Borland International's SideKick started the current furor when it was introduced in 1984. Since then, many other software companies have taken up and developed the idea of a program which resides in RAM "behind" your application program.

These programs remain hidden in the background, not interfering with the operation of the application programs you normally use. With a single keystroke, however, they can be summoned to overlay the application program and turn your computer into an electronic desktop.

So, now we find ourselves asking the question: "Is it worth it to turn my computer into a neater copy of my desktop?"

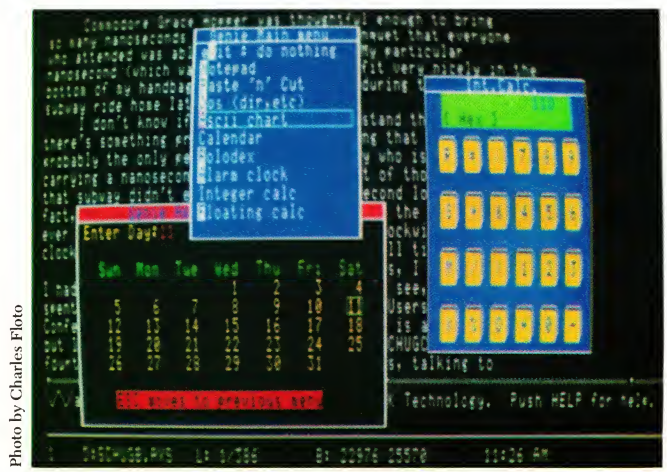

Photo by Charles Floto

Screen display from Genie.

Seeking the answer will require a little time and energy, and a fair amount of computer memory—at least 192K, although the more memory your computer has, the better.

What to look for

There are five programs currently in the spotlight for the Z100: Genie, Informer, Perks, Right Hand Man, and Whiz. All of them run under the Microsoft Disk Operating System (MS-DOS) version 2.13 or higher. One of the five, Perks, will run under the Zenith Disk Operating System (Z-DOS—Zenith's implementation of version 1 of MS-DOS). Another of them, Genie, also comes in a version for the Z150.

Each of them contains a notepad, a calculator, an appointment calendar, at least one alarm clock, and at least a partial listing of the ASCII table, which includes the hexadecimal equivalents of the "ordinary" 96 printable characters and the 32 control characters. One of them, Whiz, even gives you the remaining 128 hexadecimal characters commonly used on microcomputers to represent such things as special programming codes.

Each also comes with several other utilities, which vary from program to program, as shown in Table 1.

Regardless of which features come with which program, there are at least six requirements you should keep in mind when looking at a desktop utility. Lacking even one of the six will make a program more difficult to use and might hamper your productivity. (After all, if an electronic desktop doesn't make life easier, why not just use the real thing?)

1. The desktop utility must be compatible with your foreground programs. It is nice to be able to send data to and from the foreground program with your electronic desktop. If that's not possible, at least get one that doesn't squabble with your foreground program over who gets to talk to the operating system.

2. The program should use the standard keys for editing, such as the arrow keys for cursor movement and the insertion and deletion keys. After all, who wants to learn a new word processing sys-

tem just to jot a few memos?

3. Good on-line help is a must. Why bother cleaning the calculators, scratch pads, and appointment calendars off your desk only to replace them with computer documentation?

4. The data displays have to be easy to access. Trudging through innumerable menus and file specifications to get today's calendar of appointments is definitely not the way to increase productivity.

5. The program should require a minimum of disk use. The more time your computer takes to search disks for utilities or data, the more time you spend twiddling your thumbs. It is also a hassle to constantly shuffle disks. Everything should fit on one disk, preferably the boot disk. The more compact the program, the more likely it is that it will meet this requirement.

6. Good windowing capabilities are a definite plus. The best desktop utilities let you move freely from window to window and even move the windows around to see data in the foreground application program that they overlay.

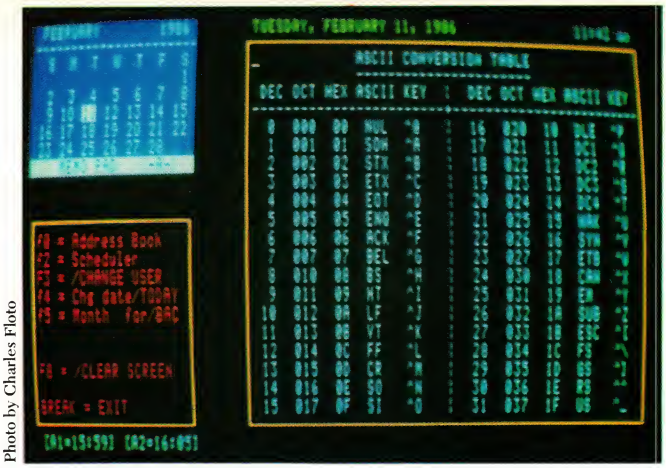

Photo by Charles Floto

Screen display from Informer.

Unbottling Genie

Available from Advanced Software Technologies for $49.95, Genie runs under MS-DOS 2, and is available for both the H/Z100 and the '150.

A decent assortment of Genie's modules will cost you at least 91K of RAM. You may very well want more, however. To get a configuration similar to that provided by Perks (discussed below), you would need about 200K. (Perks fits into only 64K.) Add that to the 40K or so required by MS-DOS 2 and whatever your favorite spreadsheet or word processor requires, and you'll see why 448K seems like a better bet for a workable amount of memory than the 192K minimum listed in the documentation.

Genie is fully memory resident except for the obvious disk-requiring data files—the appointment calendar, address-book utility, and the like.

Getting started with Genie is somewhat complicated. My version of the documentation was a bit sketchy and didn't even mention some late program additions. (Advanced Software Technologies plans a documentation update with Genie's next version.) Making things even more difficult was the skimpy table of contents, which is just not thorough enough to make up for the lack of an index.

On the plus side of the documentation is its plain-English writing style and excellent use of examples to illustrate the points being made. The applicable function keys are listed and defined in each section as well—another help.

You don't need to do any initial configuration to install Genie on your computer. Just make a copy of the distribution disk to serve as your working disk, and you're all set.

However, you can custom-tailor Genie to your needs as you load it. You can choose among four different calculators, for example, or even load a module—such as the alarm clock—more than once. However, since each module must be loaded separately, this can become tedious. Thus, you are probably best off deciding which modules you want—and your RAM can afford—and creating a batch file of the appropriate commands to load them for you.

Genie can be unloaded without rebooting by using its BOTTLE.COM file. Due to limitations within MS-DOS, though, you have to make repeated exit calls to completely clear the working memory—once for each module you've loaded. As you can imagine, it can be a pain calling Genie's BOTTLE or MEMCHK utilities as many as six or seven times. Once again, creating a batch file will save you time.

Genie is not copy-protected, so you can make as many backup copies as you need. It also has some help on-line which, although limited, improves its user-friendliness.

Notepad jottings

An adjustable text-buffer size is one of the highlights of Genie's notepad. You can set the buffer's size from 2K to 56K with a simple "–n" when you first load it into RAM. This range of values allows you to process a fairly lengthy document, about 16 pages worth. Or, on the other hand, you can jot short inter-office memos, using as little memory as possible.

The notepad window usually shows 11 lines of 51 characters each. As with the rest of Genie's windows, it can be moved wherever you want it on the screen. And, as with the others, the notepad window turns clear while in movement so you can see what is on the screen underneath.

Unlike the other windows, though, the notepad's window size is adjustable. Thus, you can go from four lines of 52 characters each to 12 lines of 77 characters. Oddly enough, the default window size, 11 x 51, uses the least amount of memory—about half as much as either of the other two.

The import/export functions worked flawlessly. Genie supports MS-DOS subdirectory names, so you can use the notepad to import or export text files on any disk or any subdirectory from within your working disk. To make sure you can edit those notepad files, Genie outputs them as ordinary ASCII text.

Files that are too large for the text buffer are handled with notable aplomb. When you load a file that is too large, Ge-

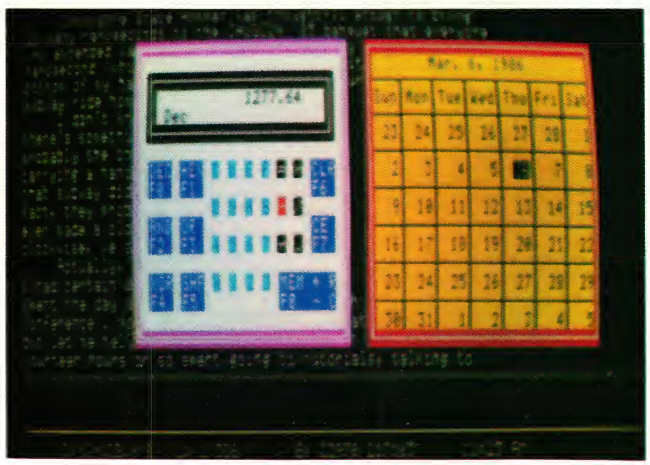

Photo by Charles Floto

Screen display from Perks.

nie informs you that the file has overflowed Genie's text buffer; then you can read what was left over with the "Next" command. The buffer overflow is still accessible if you exit the notepad module—say, for the calendar—and return.

Genie's notepad uses the '100's built-in editing keys. The arrows move the cursor around and the delete and insert keys work as they're supposed to. Some of the numeric-keypad keys allow you to go to the beginning or end of the text buffer or travel backwards or forwards by screenful. The ESCape key toggles you back and forth between the editing mode and the command menu located on the top border of the notepad window.

The outdated manual provided to me with Genie failed to mention many of the editing functions of the numeric keypad, including such important ones as the undelete key—the ENTER key. So, be sure to read the update provided on the distribution disk to learn about the many recent additions that have been made.

The printed documentation also incorrectly stated that the INSert LINE key places the cursor at the end of the line. The on-line help has it right—it inserts a line.

Genie has some special ways of doing things in the notepad which are rather interesting. For instance, if you toggle Genie's word wrap off, Genie will still wrap around to the next line as you enter text. It just breaks the line after whichever character happens to occur at the end of the line, and continues on the next line without inserting a carriage return.

Thus, although it looks like word wrap is still on, it is really off and the notepad will output a very different file. Outputting a file written with the word wrap off essentially results in one long line. The only carriage returns will be those you specifically put in. On the other hand, a file with word wrap on—the default setting—will be output with standard margins.

Another unusual characteristic of Genie is the way it hangs on to the old file name even after you've cleared the buffer and read in a new file. You have to use the delete-character key to get rid of the old title before you can enter the new one.

Just as a point of interest, Genie will ignore a character's high (eighth) bit if it has been set to 1 by WordStar. Genie can also be controlled by the standard WordStar cursor controls such as CTRL-F to move the cursor forward to the start of the next word.

Genie's notepad has no way of directly sending its output to your printer. If you want to get a hard copy, you have to output your scribblings to a file; then print it with your regular word processor or MS-DOS's COPY command.

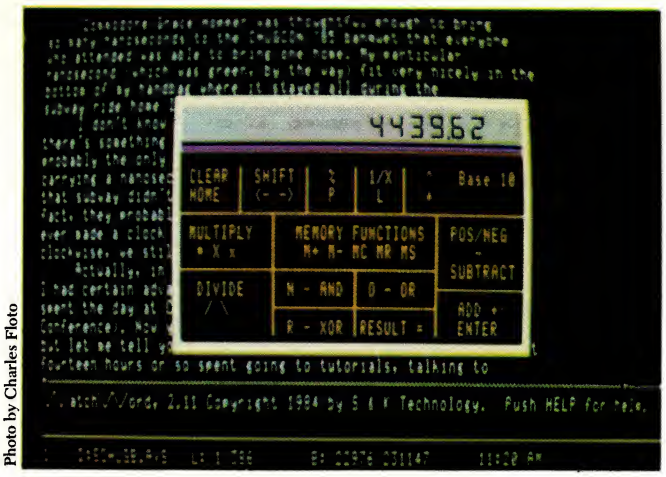

Photo by Charles Floto

Screen display from Right Hand Man.

Calculator figures

Genie provides you with not just one calculator, but a choice of six different models. There are the regular and small integer calculators, the regular and small floating-point calculators, and the regular and small floating-point 8087 calculators. You could install all of them if you wanted—and had enough memory—but one or at the most two will usually suffice. Which one to install depends upon your needs.

In all three pairs, the only differences in the small versions are the lack of fancy graphics depicting a calculator keypad and the amount of memory used—in some cases about half as much.

If you are a programmer, you will probably want to use one of the integer calculators. You can perform calculations in decimal, hexadecimal, and octal while using the Boolean operators AND, OR, and exclusive OR (XOR). The integer calculator also comes in handy if you want to translate hexadecimal or octal numbers to decimal ones.

For the business user who doesn't need to make decimal-to-hex conversions, on the other hand, Genie has the floating-point calculators. These are almost the same as your hand-held model. Their precision is adjustable up to nine decimal places, they have a memory, and like the integer calculators they use infix notation. That is, you enter the numbers and the operations just as you would on paper, "33*24=".

The 8087 calculators, as you might have guessed, use the 8087 math coprocessor, if your machine has one. They take a little less time and memory to operate than the other calculators.

Neither the integer nor the floating-point calculators have built-in trigonometric or power and root functions. However, all of them permit limited export, outputting results to the foreground program as if typed at the keyboard, by using the "O" key.

Genie lets you use the number keys on either the regular keyboard or the numeric keypad. You can also use the ENTER and "–" keys on the keypad for addition and subtraction; but for anything else, you must use the regular keyboard.

There are just two features of the calculators that don't seem up to snuff in my version of Genie—the memory recall and window movement of the integer calculators.

The memory-recall problem is, admittedly, a minor one. Put simply, you can't use a number from memory as the first number in a calculation. You can input a number, indicate an operation, then recall a second number from memory, and it will work. However, you can't recall the number from memory first and then perform an operation with it.

The other bug is a bit more serious. If you move the integer calculator window

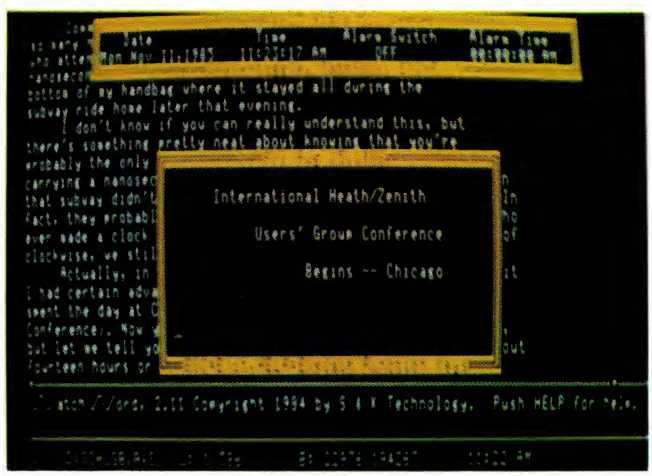

Photo by Charles Floto

Screen display from Whiz.

	Genie	Informer	Perks	RHM	Whiz
Cost	$49.95	$69.95	$69.95	$65.00	$49.95
Operating System(s)	MS-DOS 2	MS-DOS 2	MS-DOS 2 Z-DOS	MS-DOS 2	MS-DOS 2
Configurable options	no	yes	no	yes	no
Typical size in RAM	200+K	26K	63K	48K	84K
Computer	100, 150	100	100	100	100
Windowing	yes	no	yes	no	yes
Unload w/o reboot	yes	no	yes	yes	no
Access to operating-system utilities	yes	no	yes	yes	yes
NOTEPAD:					
Buffer size	2-56K	1K	4K	5-43K	3K
Standard keyboard edit	yes	yes	yes	yes	yes
WordStar edit commands	limited	no	yes	no	no
Import/Export	I/E	E	I/E	I/E	I/E
CALCULATOR:					
Bases	2, 8, 10, 16	2, 8, 10, 16	10, 16	2-16	10
Integer, Floating Point	I, FP	I, FP	I, FP	I, FP	FP
Infix or Reverse Polish notation	infix	Rev. Polish	infix	infix	infix
Graphic display	yes	no	yes	yes	no
Export	yes	no	yes	yes	yes
CALENDAR:					
Perpetual	yes	yes	yes	yes	no
Daily appointment	yes	yes	yes	yes	yes
# appointment files	unlimited	unlimited	256	unlimited	unlimited
Import/Export	I/E	E	E	I/E	E
ALARMS: #	8-80	2	8	24/day	1
ASCII TABLE: # characters	128	32	128	128	256
SCREEN SAVER:	no	yes	yes	yes	no
ADDRESS BOOK:	yes	yes	no	yes	no
Modem support	no	yes	N/A	yes	N/A
# cards allowed	unlimited	256	N/A	1,000	N/A

Table 1. Program characteristics of the five desktop utilities reviewed. See text for details.

too far to the right, the rightmost columns break off at the edge of the screen and reappear in little pieces scattered across whatever happens to be on the screen, including the rest of the calculator itself. The fragments remain firmly on your screen, even after you exit Genie.

The effect is two-fold. First, you may have to redraw any underlying graphics on your original screen. Second, any time you call up the calculator for the rest of that session you get a moth-eaten apparition that's hard to read. It still works, but it's not pretty.

Calendar pages

Other than a bit of awkwardness with menus, Genie's calendar works well. There is no perpetual calendar already in memory, so Genie has to create each year of monthly calendars as you access it. In this respect, Genie is very forward looking. You cannot access any year earlier than 1984, but you can try going forward a long ways. Yet, if you get up too high—somewhere in the next century—the calendar's display gets messed up a little and extraneous numbers appear on the screen in Genie's other modules.

Genie lets you have as many appointment files as your subdirectory or disk will hold. Each file consists of 24 lines of 29 characters each, with each line premarked with an hour between 0:00 and 23:00.

To enter an appointment, you can use the keyboard's built-in editing keys, just the way you did in the notepad. But you have to slog through some menus first. For example, let's say you wanted to record your spouse's birthday every year for several years to come so you wouldn't forget it.

The first thing you would do is call up the calendar from Genie's main menu.

The calendar menu will let you display the years that calendars have already been created for. If 1986 isn't there, you key in "1986" and press return to have Genie create it for you. Next you are presented with a menu containing the twelve months. You can either type in the number of the month—2 for February, for instance—or you can use the space, backspace, or arrow keys to highlight the month you want. In any case, after choosing the month you choose the day in much the same way. In all of the calendar menus, the default is the current year, month, and day.

Okay, let's say that you've made your entry and you're covered for 1986. To get to 1987, you have to work your way back through those same menus, hitting the ESCape key this time. Eventually, you will be back at the "select year" menu and can have Genie create 1987 for you. Then you go through the whole process again. It would be easier to zero in on that key date if Genie had a perpetual calendar where you could just skip through the years, months, and days with single keystrokes.

If you want to import or export information from the calendar, you have two options. You can either send the information directly to your printer or you can import/export a disk file using Cut and Paste, one of the utilities provided with Genie. (More on Cut and Paste later.) Since appointment files have a way of multiplying very quickly, it helps that Genie's are removable.

Electronic addresses

Genie's "Rolodex" utility may be one of its most useful. The Rolodex or address book does its utmost to ensure that you will never again have to flip through hundreds of cards on a little wheel. You can easily add a new card or output the displayed card to the current cursor position. It is in searching and printing, though, that the electronic address book shows that it is more than an expensive copy of its paper cousin.

Using the example from the manual, let's say you want to look up John Smith. Being the absent-minded type, you can't remember whether you filed him under John Smith, J. Smith, or even Smith, John. If you use wildcards and enter "*Smith*" Genie will find it—as well as any other Smiths you might have.

Or, if in the middle of a hectic day you got a message to return a phone call, and all you were given was the phone number, you could have Genie look that up in its address book and tell you the matching name.

Unfortunately, Genie will locate only those files which contain the exact string you've specified—allowing no extra characters. For example, if you type "Smith", Genie's search won't turn up "Smith, John", or "John Smith". Instead, you have to use the wildcard characters, "*" and "?", wherever there might be another letter lurking. If you don't remember whether you entered Smith's last name before or after his first name, you'll have to enter "*Smith*" just to be on the safe side.

It goes without saying that you have to use the same procedure if you aren't sure what the last name was. "*Smith*" will also locate "Smithson, Kurt J.", for instance, as well as "Allsmith, Elizabeth" or "Errol's Blacksmith Shoppe." Upper- or lowercase letters don't make a difference.

A much more workable solution for searches would have been to allow two options, search for a string embedded in text, or search for a string standing by itself. Thus, if you wanted just to find any "Smith" you would specify the standalone option. If you wanted any derivation of "Smith," you would specify the embedded version.

Printing from the address book works in a similar way. You have to input the same search criteria, and Genie will locate and print all the cards that meet your requirements. You can have the whole card printed or just part of it. You can even have the phone number printed first, followed by the name and nothing else. This ability, too, seems useful.

As an example, suppose you are in charge of your company's sales in the Midwest. You've just gotten wind of a prospective buyer in DeKalb, Illinois, and you want to see which salespeople you have in the area so you can give one of them a call. You can use the address book to spit out the names and phone numbers of all your people in Illinois, and within minutes you're talking to Marcia in Chicago.

If you are really a big wheel, you can even have multiple address books, one for salespeople and one for friends, say. All in all, the address book seems pretty handy. It is interesting to speculate on what it would be like to have an automatic dialing capability, with the address book supplying the phone number.

Bells and whistles

Genie has many other features that can only be touched on here. Among them are the Cut and Paste module, a typewriter module, Genie's operating-system commands, and the inevitable ASCII table and alarm clocks, as well as a keymap option.

The Cut and Paste module does just what it says. It is a handy way to move a marked block from one place to another, just as if you had typed it in on the keyboard. There are even options to choose how Cut and Paste handles tabs, carriage returns, and buffers.

The typewriter module outputs your keystrokes directly to your printer, letting you use it as a typewriter. This is perfect for such things as addressing an envelope.

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Genie's operating-system commands work very similarly to the familar MS-DOS ones. DIR, COPY, DEL, REN, MKDIR, RMDIR, and CD (Change Directory) all do pretty much what you'd expect. One difference is that you can use synonyms such as CAT and LS in place of DIR. Also, DEL comes with a query function. Genie also includes a FIND command that will search an entire directory tree for a file name.

The TYPE command is a souped-up version of its MS-DOS counterpart. By using it with wildcards, you can have it type one file after the other to the screen, waiting for your prompt before displaying the next screenful. You can also use it to search for character strings in a file instead of viewing the whole thing.

The ubiquitous ASCII chart is another one of Genie's features. It is displayed in a single column, 16 characters at a time. You can move up and down through the 128-character list only by windowful.

It has been said that we feel too pressured by time constraints and should relax more. Well, you'll find little of that relaxation with Genie. Would you believe it can have up to 80 alarm clocks? To get 80 alarms, you just install the base module (eight alarms) ten times.

When an alarm sounds, it can either open a window with a message or output the message to the cursor position as if you had typed it.

A couple of words of warning are in order, however. First, choose the window option if you don't want your current program to think you're inputting strange commands on its command line. And second, be careful when using the alarms with Lotus. The alarms with my version of Genie either wrote spurious data to the spreadsheet cells or locked up the computer, forcing a reboot.

Oh, yes. One other thing about the alarms. They come equipped with adjustable snooze buttons. Talk about plush.

The keymap feature, although perhaps just as plush, might also be more useful. With it you can turn the keyclick on or off and redefine any keys you desire. You can even call up a file that contains a whole set of previously defined keys—even from within your application program.

Just remember to disable the keymap before you exit Genie if your foreground program would be difficult to operate with strange key definitions. (I omitted this step with disastrous results in WatchWord. Not only the specifically mapped special function key was changed, but all of the special-function keys were.)

Snitching on Informer

Available from Sunflower Software for $69.95, the Informer runs under MS-DOS 2 on the '100.

Informer will work most of the time with only 192K of RAM since its memory requirements are so much smaller than the other four programs. Its memory demands are reduced because it is not as fully memory resident. This slows down many functions, often aggravatingly so. Informer is not copy-protected, so it's easy to make backup copies.

It may take a little longer to install Informer than some of the other desktop utilities because you have to work through a configuration program before you can load it for the first time. Among other things, the configuration program, INCONFIG.EXE, creates a disk subdirectory INF-DATA for Informer to work with. Every time you run Informer, it must have access to that subdirectory for (nearly all of) its modules to work.

Informer loads in one piece, unlike the separate modules of Genie. To unload it, though, you have to reboot—a messy way of doing things.

Another awkward feature of Informer is its user codes. Informer is designed to support multiple users: so when you first install it, you have to supply a three-letter identification code. Then, every time you load Informer, you have to include this code. It is easy to forget to do this, though, and then you have to retype the loading instructions. It also means that you can't easily read other people's files unless you know their user codes.

The identification code is not intended as a security password, but one could certainly see minor access problems arising if more than one person used Informer. For that reason, and because of the extra hassle of typing in "xyz" while installing Informer, I think this feature should be discontinued or at least made optional. Sunflower Software suggests they might do so in future releases.

Although it is not as glossy as, say, Perks's small manual, Informer's documentation is adequate, nevertheless. Its 36 8½" by 11" pages are organized by modules. The table of contents is detailed enough to almost pass as an index. The documentation is thorough, including explanations of some of the program's limitations.

The summary list of function keys used in Informer is a necessity, since the on-line help is limited to a list of possible commands. Unfortunately, the on-line list is not a complete one: CTRL-A, which calls the alarm clocks, and CTRL-C, which calls the calculator, are missing.

Informer also has some trouble handling errors. If, for example, you don't have the disk with Informer's data files in the right drive when Informer needs it, Informer will tell you "Insufficient space to create a necessary file." It even goes so far as to suggest that you delete a file from your disk to create more room! The other four desktop utilities tell you that they can't find the necessary files if they encounter a similar situation.

Notepad jottings

When you invoke Informer, you are put in the notepad mode. In a sense, this

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is the only mode the program has. All of the other modules, such as the calculator or the scheduler (appointment calendar) are displayed inside or along the border of the notepad space. Thus, Informer doesn't really have windows—just one display that takes up the whole screen and remains relatively constant.

What does change in the display is the menu in the lower left-hand corner. As your command options change, so do the menus which display them.

Informer's notepad acts more like a pad of scratch paper than those of the other four desktop utilities. It has 37 separate buffers, one for each of the letters of the alphabet and the numerals 0-9, as well as one coded with your private identification code. Each buffer is a "page" of the notepad, 20 lines of 49 characters each. There is even a command to "tear off the top sheet" of your notepad.

The notepad comes supplied with three sheets already filled—the ASCII chart in buffer A, an English-to-metric conversion table in buffer C, and a list of Sunflower Software products in buffer S. The notepad is good at holding short, unconnected notes. However, the small buffer size of each one is a drastic limitation—one reason why the ASCII chart contains only the first 32 characters, for instance.

The editing keys seem matched to the small buffer size. No WordStar emulation here—the keys are limited to the bare necessities, the arrow keys for cursor movement and the usual deletion keys for text manipulation.

The insertion keys, however, work a little differently from what you might expect. The INSert LINE key's function is helpful. It inserts the last deleted line from a buffer, making it useful for cut and paste functions.

The Insert Character key is not so helpful—Informer turns it into what should be called an Insert Space key, because that is all it will insert. Admittedly, the notepad's editing functions are somewhat clunky, but probably adequate for the small size of the text buffers.

Informer will automatically save the notepad sheets to disk. (Provided you have the disk with Informer's data subdirectory on it in the correct disk drive.) On disk, however, each sheet is a file unto itself; so you cannot output a notepad sheet to a file, because it already is one.

Calculator figures

If you like Hewlett-Packard calculators and Reverse Polish notation, you'll love Informer's calculator. If you don't, then forget it. Reverse Polish notation means that you enter the numbers first, then the arithmetic operator. As an example, 22 * 40 becomes 22 40 * .

It becomes even more confusing when you have a large numbers of operators. To get

([12 + 32] * 2) + (44 ÷ 4)

you type the following:

12 ⟨ENTER⟩ 32 + ⟨ENTER⟩ 2 *
44 ⟨ENTER⟩ 4 ÷ +

A programmer may think this way, but your ordinary business user?

The calculator works in decimal, hexadecimal, octal, and binary. Its power and root functions work only in decimal, and it can use the Boolean operators AND, OR, and XOR only in the other three modes.

In addition to the main memory with the usual save, recall, add, and subtract functions, the calculator has eight other memory buffers which can be used to hold constants. The Informer also has an eight-level stack which is used to store intermediate calculation results. It enables you to do some fancy calculations with these results.

This stack was inspired by the Hewlett-Packard calculator, and Informer's documentation suggests you consult a calculator manual for further instructions. Once again, okay for programmers, not too useful for people in business.

You can use the numeric keypad for the four basic arithmetic operations, with the down arrow for division and the up arrow for multiplication. The ENTER key in this case is used for addition while the RETURN key is used to enter.

Is it worth it to turn my computer into a neater copy of my desktop?

There are no graphics used for the calculator, just a single line with each entered number displayed in turn. The result, by the way, is non-exportable.

Calendar pages

Informer has no perpetual calendar and, like Genie, uses a simple algorithm to calculate each year. Thus, although you can input the year 1776, say, to see what day of the week the Declaration of Independence was signed on, you won't get the right day. (That's because 1900 was not a leap year.) Unless you're a historian, though, this shortcoming is probably unimportant.

As far as more practical considerations go, Informer lets you have as many appointment files as you wish. However, each day's file is the same size as one of the notepad's, at 20 lines by 49 characters. Each file therefore takes up about 1K of space; so, your disk can fill up very quickly.

Each day is broken up into half-hour intervals. You can edit your appointments using the same keys as with the notepad, along with a few extra ones to move forward or backward by days or months. Appointment files can be output to your printer from within Informer.

If you wish, you can delete a day's worth of appointments at a time from within Informer. But Informer stores each month as a separate file; so, if you want to delete an entire appointment file, you have to do so by using MS-DOS to delete it from the INF-DATA subdirectory.

The highlight of Informer's calendar is its search capability. It can look through its calendar for the current month to find a string of up to seven characters. (This same search feature also works with the address book.) Thus, if you can't remember, you can find out what day you scheduled the staff meeting on employee absenteeism. After all, it would look pretty bad if you missed that one.

Electronic addresses

Informer's "Address Book" is at least as useful as Genie's Rolodex utility, if not more useful. The address book makes use of the same seven-character search string that the appointment calendar uses. And it, too, uses the same editing keys as the memo pad. Since nearly all of Informer's modules are handled from a single type of display, the menus and commands for the modules have a lot of overlap. This makes them easier to learn to use.

Each of the address book's small, five-line cards are referenced in the subdirectory, along with everything else. The Informer will let you keep track of up to 256 friends' or business associates' phone numbers and addresses. Then, when you want to give one of them a call, you can have Informer locate their card and, prompted by a CTRL-D, dial the number for you.

Of course, you need the proper equipment for the autodialer to work. Informer's documentation says it will work with both external and internal autodial modems. The external one must be hooked up to the computer via the Auxiliary port (usually J2). The internal one must be an S-100 modem card. Either way, Informer is capable of dialing as many as three sequences of numbers with touch-tone dialing. This enables you to reach an outside line if need be, dial special access codes that your long-distance company may require, and then dial the phone number.

The documentation did not mention which types of modems Informer supports, so you might want to check before you buy to see if your system is compatible.

Bells and whistles

Sunflower Software included several extras with Informer, among them two alarm clocks and a screen saver that darkens the screen when the keyboard is inactive for a user-selected period of time. The clocks certainly got points for having the most annoying alarms. There is no way you could possibly snooze through them.

The alarm clocks, however, were

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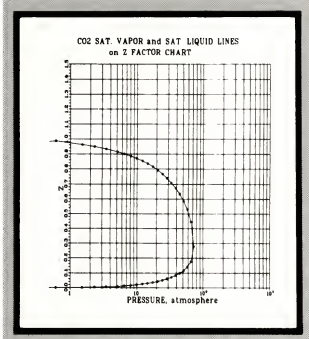

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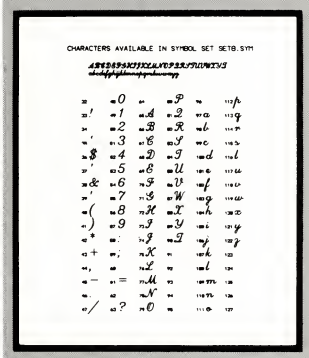

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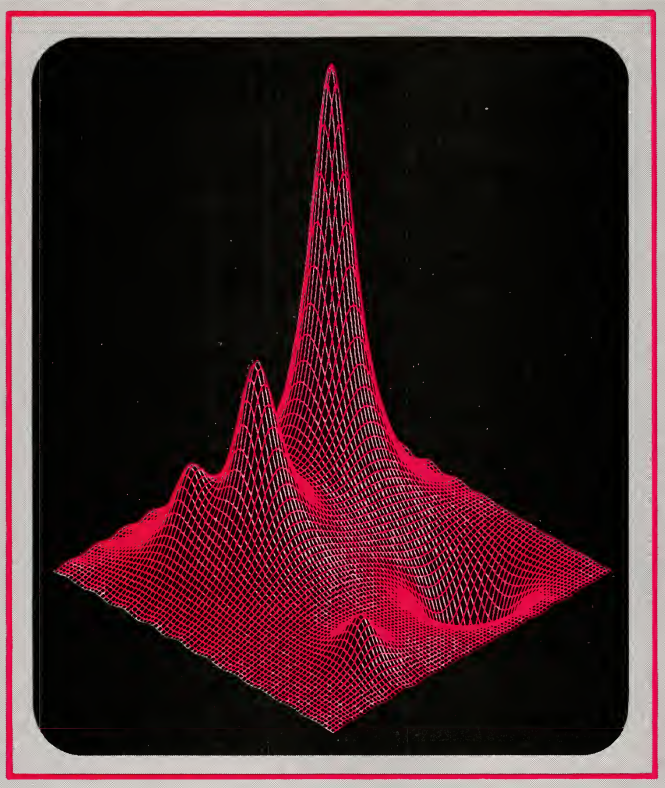

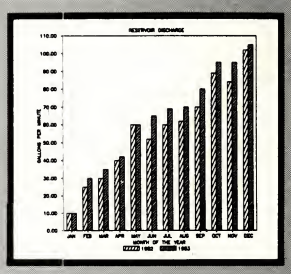

Business Graphics

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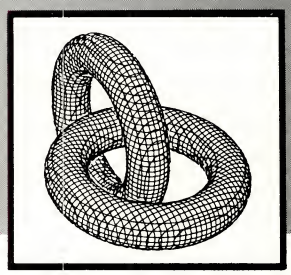
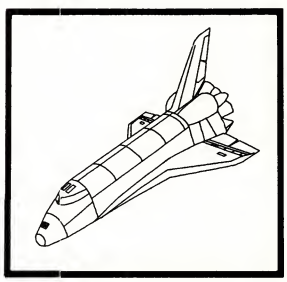


Program Output



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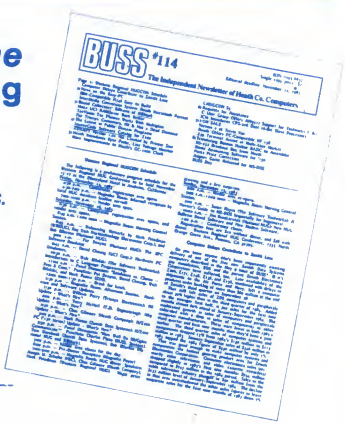

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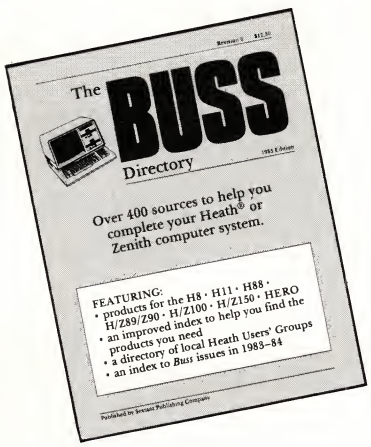

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annoying in ways other than their sound. When setting them, you first use CTRL-A to call up the alarm function. Then you use it to toggle back and forth between Alarm #1 and Alarm #2. That's okay, but guess how you turn off the alarms, at least in my version? Uh-huh, CTRL-A. I tried to turn off an alarm that went off while I was in Informer; all I did was toggle back and forth between Alarm #1 and Alarm #2. Meanwhile, the alarm was driving me crazy. I had to *exit* from Informer, *then* hit CTRL-A to turn it off.

The alarms can't be set for a given calendar date; so they'll go off every day at the set time until you disable them (by entering an invalid time, such as 25:15).

Informer also offers an ASCII chart, as mentioned before, in one of the notepad's buffers. Thus, the size of the notepad limits it to the first 32 ASCII characters—not very useful for programmers. This is rather odd, since some of Informer's other features were so plainly set up with the programmer in mind.

Another feature Informer has is enhanced command-line editing. It adds several keys to the F0-F8 keys set up by MS-DOS for editing the command line. The added keys include the Insert/Delete Character key and some of the cursor controls.

Last, but not least, Informer comes with an INCONFIG.EXE program. This allows you to customize different aspects of the displays such as the assignment of colors. You can also adjust the way the calendar or the address book output their files to the printer, what constants (such as pi) are permanently stored in the calculator, the time limit on the screen saver, and how your modem is set up.

Informer's INCONFIG.EXE program is also supposed to allow you to insert repetitive events into your appointment calendar automatically as Informer creates each month. However, my version of INCONFIG.EXE occasionally messed up and wrote garbage throughout the whole month being created. The garbage seemed to originate in RAM, but I'm not sure exactly why Informer inserted it.

Perking up your computer

Available from Barry Watzman for $69.95, Perks runs on the H/Z100 under either MS-DOS 2 or Z-DOS—making it the only one of the five to run under both.

Perks occupies just under 64K of RAM, so a computer with 192K or more of RAM is usually adequate, although I would recommend at least 256K. Perks is fully memory resident—again, excepting some data files. It is not copy-protected.

Perks comes with one of the more cleanly designed manuals of the five desktop utilities tested. Its 30 pages of text reflect for the most part the professionalism of the glossy cover. Only when explaining the hexadecimal functions of the calculator does it seem to become bogged down in technical details. However, as is the case with any of the hexadecimal, binary, or octal calculators discussed so far, the hexadecimal one is intended for programmers, who are probably well acquainted with the various numerical systems (including two's-complement notation) discussed in Perks's documentation.

The thorough table of contents easily makes up for the lack of an index. In addition, Perks's documentation has a good discussion of some of the problems and limitations likely to be encountered while using it. The documentation's only weakness seems to be a paucity of examples used to illustrate the points being made in the text.

Perks installs quickly and easily because there are no configuration options to choose from or sub-directories to create. You do not even need to specify which version of Perks you want, Z-DOS or MS-DOS 2. When you want to load it later on, all you have to do is type PERKS.

Because all its modules are loaded at once, Perks can also be unloaded with ease. There are no incessant exit calls to the operating system to worry about. A simple ⟨BREAK⟩, then ⟨SHIFT-BREAK⟩ will do it.

The on-line, context-sensitive help that Perks features must be mentioned, as it is second only to that of Right Hand Man. More than just a list of commands that are available for use in that window, the information also explains a little of what those commands will do. Help is available from anywhere in Perks just by hitting the HELP key.

Notepad jottings

The notepad buffer on Perks is 4K in size—about 4,000 characters—which is adequate for most occasions. However, Perks provides WordStar-like commands for entering those 4,000 characters. This gives Perks's notepad plenty of editing power—perhaps too much. Do you really need all the power (and awkwardness for the uninitiated) of WordStar when jotting a memo? Fortunately, most of the Z100's built-in editing keys work—such as the arrow controls for the cursor. This gives the user a choice.

The insertion and deletion keys also work, except for the Insert Character key which does nothing. Almost none of the special-function keys are used for editing commands, which seems a waste. They would have presented a nice alternative for users who don't care for WordStar's control-character commands.

All of Perks's windows move, including the notepad window. However, unlike the other windows, the notepad size is adjustable from the default of eight to as many as 14 lines, each containing 79 characters. This size adjustment is not without its problems, though. On a few occasions when I was adjusting the window size to its maximum, garbage appeared in a couple of lines in the window. This occurred sporadically and for no discernible reason. Fortunately, this is a display problem only, and doesn't affect the notepad content—although it can be rather disconcerting.

Even though it uses WordStar editing commands, at least Perks doesn't output text with the high bits set. It sticks to standard ASCII.

On the other side of the coin, Perks is proficient in most respects when it comes to importing. It handles the set high bits of WordStar text by ignoring them. It marks embedded control characters with a caret (^) to alert you to their presence.

However, one of the few places where Perks's polish wears thin is in the import mode. If you feed Perks a file that is too big for it to digest, it fits as much into the buffer as it can and ignores the rest. Fortunately, it warns you of this; but Genie's "Next" command or Whiz's scrolling, both of which let you see the whole file, seem like better deals.

Once you have started entering text, you can't assign a new file name to replace the existing one without losing your text. You have to assign the name you want before beginning to edit.

Perks's notepad can output directly to the printer. This is handy if your notes are to be read by anybody but you.

Calculator figures

Perks has only one calculator, which can operate in two modes: hexadecimal mode or decimal mode. Each mode accommodates a different kind of user. Both of the modes feature the same colorful graphics display.

The hexadecimal mode is a programmer's integer calculator which allows the Boolean operators AND, OR, and XOR. It uses two's-complement notation to show negative numbers while in the hexadecimal mode.

The decimal mode is a nine-digit floating-point calculator designed more for the business user. You can use the numeric-keypad keys for operations, including specially designated keys for multiplication, division, and total.

The two-in-one nature of Perks's calculator saves memory, as well as allowing you to use many of the same functions in both. For instance, both calculators use infix notation, letting you input the operands and operators in their normal order. And both feature a memory with save, recall, add, and subtract functions.

The calculator results are exported to the foreground application by "programming" an export key. This takes only two keystrokes in the calculator module, "P" for program followed by the desired key. The number displayed on the calculator will be saved. Once you're back in the foreground program, the first time you hit the programmed key the number appears as if you'd typed it in. It only

works once; after that, the programmed key is disabled so as not to interfere with the foreground program.

Calendar pages

Perks contains both a perpetual calendar and an appointment calendar. The perpetual calendar covers the whole of the 20th century, starting with the non-leap year, 1900.

The relationship between the perpetual and appointment calendars is logical. You simply type in the date you want or use the cursor arrows and/or designated letter keys to move around the perpetual calendar until you reach the desired date. Then you toggle from the monthly-calendar display to the appointment-book display with an "L", "l", or CTRL-L, the same way you got to the perpetual calendar from the main menu.

Each of the appointment-calendar files has 26 lines with 19 characters each, broken up into half-hour intervals from 7:00 a.m. to 7:30 p.m. Perks allows you up to 256 of these files on whatever disk you specify.

Just be careful if you expect to use all 256 files. Perks does not really erase an appointment file once you've created it. When you tell it to erase one, all it does is erase the date—the data remains on disk. The space is saved until it is needed for another appointment file's data. Since a full appointment calendar will take up over 128K of space on your disk, you can run into problems if you're not careful.

The Perks appointment calendar is quite limited when it comes to editing functions. None of the WordStar commands used in the notepad are available. Instead, you must enter your appointments by using the cursor controls to reach the correct time slot, and backspace to make corrections. The appointment file can be output to a printer, but not to a file name of your choice.

Bells and whistles

As you might expect from Perks's name, its features don't stop with the basics. It may not have an address file or the accompanying search functions, but it does include a screen saver, an ASCII chart, alarm clocks, and a limited number of operating-system functions. All of these extras, except for the 128-character ASCII table, are lumped together under the Filer & Setup module. The Filer & Setup module contains a menu of Perks's options. You make your selection using the special function keys F0-F9.

F0 sets the screen saver to blank the screen after a user-selectable period of inactivity, from one to 255 minutes. Entering "0" will turn the screen saver off.

F1 sets Perks's eight alarm clocks. Each can be set to go off daily or just on one date. Hitting any key on the keyboard will turn the alarm off after it sounds; otherwise, it will stop after one minute of its own accord. (This seems particularly well thought out. No more fumbling, trying to remember the command that will turn the alarm off while it shrills away.)

It is here that a bug in my version poked its ugly head up. If I used ESCape to exit from the alarm-clock setup display, part of the display persisted into the main Filer and Setup menu, making it extremely hard to read.

The F2, F3, and F4 keys list a directory, erase files, and save the current Perks configuration to disk, respectively. You can use wildcards and path names to reach the directories and files you want.

The specifications for the appointment, help, and PERKS.COM files are set by the F7, F8, and F9 keys. This gives you flexibility over where you store these space-consuming data files. Each time you boot up, for instance, you may want to put a disk in drive D: containing all your help and appointment files. With the F7 and F8 keys, Perks can still locate the necessary files without cluttering up your working disk with them. After all, that appointment calendar alone may take up over 128K of disk space.

The last two keys, used in combination, are the two most powerful ones. F5 lets you set the default drive and F6 the default directory. Since these settings remain in effect upon exiting to your foreground application, you can essentially add path-name support to Z-DOS pro-

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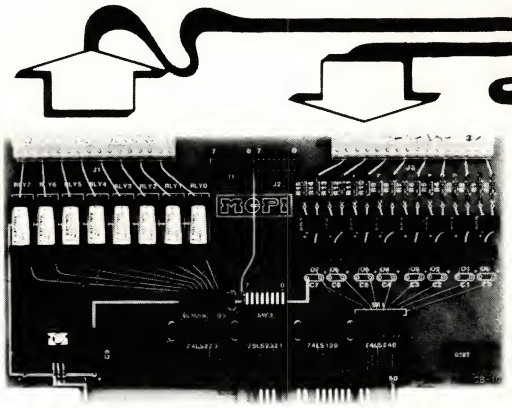

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grams. This involves some dangers, of course, especially if you change a directory path after your foreground program contains some open files. But in general, the abilities of these two keys should prove very useful.

Right Hand Man's dexterity

Available from Red E Products for $65.00, Right Hand Man (RHM) runs under MS-DOS 2 on the '100.

RHM can be configured to use as little as 28K of RAM, although 48K is the default size. RHM is memory resident except for the usual appointment, help, and address-book files.

RHM's documentation is somewhat more densely written than that of the others—as well as being longer, 44 pages. Examples which might enlighten the novice user are few and far between. However, any shortcomings in the written documentation are more than made up for in the on-line help.

To begin with, the file RHMDEMO.COM that is included with RHM is a self-executing demonstration that takes you through all the modules and menus in RHM, explaining what is happening as it goes. This alone would be worth the price of admission, but RHM also gives you context-sensitive help from anywhere within the program. Out of the five electronic desktops, RHM's on-line help was the best available, giving you more usable information when you needed it.

You may need to do a little configuration before installing RHM. RHMCON, which is provided with RHM, gives you around 20 choices in a menu format. Among other things, RHMCON allows you to set paths for RHM's data files, change the text-buffer size, change the colors, or change the screen-saver time limit. Most users will be satisfied simply to input the default drive and exit; but if you want or need to do more, the menus are self-explanatory.

RHM loads all in one piece and also unloads in one piece, without rebooting. (You have to be careful, though. The usual reason for unloading a desktop utility is because you are running out of memory. If you are nearly out of memory, you might not be able to invoke the unloading procedure, since it seems to require a fair amount itself.)

Notepad jottings

RHM's notepad features an adjustable text buffer, from 5 to 43K. (This is one of the things you set from the configuration program.) The default is 10K, which is probably more than adequate for most of your needs. In order to use a buffer greater than 26K in size, you must configure RHM so that it stores the foreground screen on disk, rather than in RAM. This works, but the time it takes to load RHM can be measured in minutes. You are better off with the 26K buffer limit.

RHM doesn't have a multiple windowing capability. The single 42-character by 11-line window displays each of the modules as you call them. Therefore, just as with Informer, there is no way to have more than one active module at a time. Unlike Informer, however, RHM can move its windows around the screen, to one of nine pre-assigned positions. Thus, you can get a peek at information on the screen if you need to.

The import/export functions work well. They allow you to mark and move blocks of text by using the special-function keys. By the way, RHM makes these keys into macro keys. So you can program them if you like. Not only are most of these keys active throughout the various modules of RHM, but they are also active in the application program while RHM is memory resident, similar to Genie's macro keys.

However, there is an important difference between RHM and Genie. RHM's macro keys are invoked by using the BREAK key in combination with the special-function keys. This means they don't interfere with the special-function keys already defined by your application program.

Editing in RHM is done mainly with the cursor controls and the insert and delete keys. The shifted cursor controls move you around the text by larger jumps.

RHM doesn't have word wrap; instead, it allows you to have extremely long lines. However, RHM can't display more than 42 characters. It just keeps pushing the line to the left to make room on the screen.

The current status of the notepad—cursor position, amount of text buffer left, line number, and so on—is displayed in the top border of the notepad.

One unusual feature of the notepad is that it can handle the H19 graphics set, including importing and exporting it. (However, it may not be the best idea to export graphics to the MS-DOS command line—though all you'll probably get is harmless garbage.)

I had several gripes about the notepad—two minor ones and one major one. The first minor gripe is that RHM won't allow you to save the file under a new file name once you have edited it. This is a nuisance if you don't want to overwrite your old file each time you modify its contents.

Number two on the list of gripes concerns the carriage return. Try hitting it when you're at the start of a line of text. It looks like the cursor has moved to the next line, but anything you type in will be appended to the end of the previous line. This may prove an irritation just because it is handled so oddly.

The final and most serious gripe concerns the way RHM handles text buffer overflow. You can read in a file that is too

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large for the buffer, although you will lose any text that overflows. However, let's assume that you are entering text by typing—as I was.

(The notepad keeps a running total of the buffer's status, including how much space you have left. You can't look at it constantly, of course, but you know when you're getting close.)

All of a sudden I heard a warning beep. Probably like most typists, I entered at least one or two characters in the time that it took RHM to ring the warning bell. Surprisingly, at least in my version, RHM displayed those characters, and I could enter even more if I wished.

Being the smart type, though, I realized that I'd exceeded the buffer and those characters wouldn't be printed. Therefore I might as well delete them, right? Surprisingly—as well as exasperatingly—I couldn't. My screen would go blank, garbage would appear all over it, or other strange things would happen. Regardless, the system locked up and I had to reboot.

There was only one key that I found safe to hit after overrunning RHM's text buffer—the ESCape key. This is the key used to exit and save what you have written. However, I had to hit this key without trying anything else beforehand. (The F0 key—exit without saving—also let me avoid keyboard rigor mortis; although, of course, I lost my editing changes.)

Calculator figures

RHM provides you with one calculator that operates in binary, octal, decimal, hexadecimal, and anything in between. Thus, if you want base 7, you've got base 7. It contains the AND, OR, and XOR Boolean operators, but doesn't have any built-in scientific functions. (You can edit the help file for the calculator and add some formulas if you'd like, which is helpful.)

The calculator has an unusual appearance. It is a graphic display, but it isn't of your standard calculator. Below the 14-digit display area, it is really just a table listing keys and functions. It looks rather strange at first glance, but it proves easy to figure out. The calculator has the usual four memory functions and can export results to the screen cursor position.

The numeric keypad works for entering numbers and adding and subtracting; but for more complicated functions, you have to use the regular keyboard. Regardless of which keys you use for input, you enter the numbers in infix notation.

As a nice touch, the calculator uses powers of ten to display numbers of more than 14 digits. Thus,

3,140,000,000,000,000

becomes 3.14 15 (3.14 times 10^{15}).

Calendar pages

RHM does things a little differently from the other four desktop utilities when it comes to its calendars. For the most part, they seem to be changes for the better.

The perpetual calendar (good from 1900 through 2079) displays ten weeks at a time, with the selected month in the middle. This allows you to see at least two weeks on either side of it. The days with appointments in them are shown in a different color, so you can easily spot them, although you can't access the appointment files directly from the monthly calendar module.

The appointment calendar has its own module. Each day comes preset with hourly slots from 8:00 a.m. to 5:00 p.m. You can add times in between if you want to. Or you can write lengthy lines after each entry. You just can't exceed a total of 512 characters per day. Unfortunately, RHM doesn't flag an improper time for an appointment. So, if you accidently type 111:00 a.m. or sandwich 7:30 p.m. between 7:00 and 8:00 a.m., RHM doesn't know it exists and won't beep you with its alarms.

The slickest part of RHM's appointment calendar is these alarms. Instead of having a limited number of alarms in their own separate module, RHM allows you to set up to 24 alarms per day in the appointment calendar. Thus, when that important 2 o'clock meeting rolls around, an alarm sounds several times and RHM opens a window with the message "Appointment alarm" written in it. It prompts you to hit the space bar; upon

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your doing so, it shows you the appointment file for the day.

Just as in most of RHM's modules, you can use any of the notepad editing keys in the calendar. The import and export functions work as well.

Electronic addresses

The "Card Index" provided with RHM uses the same keys as the notepad to edit its 256-character cards. RHM can have up to 1,000 such cards in its card index (address book) and has the ability to search among them for a character string.

The search function turns out to be somewhat limited, however: it can't use wildcards, and it only searches through the name field of the cards. You can't locate somebody by address as you can with Genie or Informer. You also have to input the string from the beginning. In other words, "smi" will locate "Smith, John E." for you—as well as any other "Smith", "Smithson", or other similar names. However, "mith, John E." will get you nowhere.

You can import and export data from the card index. RHM can also autodial a phone number from one of the cards, using a smart modem. As with Informer, the smart modem (Hayes-compatible) must be hooked up via an RS-232 serial port or with an internal S-100 board.

Bells and whistles

RHM offers you a few extras, including an ASCII table, programmable macro function keys, and some operating-system commands.

The ASCII table contains 128 characters, displayed in screenfuls of 20 characters at a time. Since RHM allows you to import and export H/Z19 graphics characters, the ASCII table might prove more useful with RHM than with the other four desktop utilities.

As previously mentioned, RHM lets you program the thirteen special-function keys, F0-F12, as macro keys. Their default settings aid you in calling up RHM's modules or marking text for import or export. However, you can change them to whatever you want and then call them up from within RHM or from your applications program with a BREAK/special-function key combination.

The operating-system utilities are typical ones, allowing you to get a file directory; change the date and time; make, remove, and change directories; and copy and delete files. The copy command comes with a query option, which makes one wish that the delete command did as well. When you input the date or time, make sure you do so with hyphens (the way RHM displays them) and not with slashes as the documentation tells you to.

The Whizard of MS-DOS

Available from Software Wizardry for $49.95, Whiz uses about 84K of RAM under MS-DOS 2 on the '100.

Whiz can work with 192K of RAM, but the documentation suggests 448K. Actually, 256K would probably be the least amount of memory needed for practical operation. The program is fully memory-resident except for data files. Like the other four desktop programs, Whiz is not copy-protected.

"Concise, understandable English" best describes the documentation that comes with Whiz. It includes an explanation of Whiz's limitations and gives a table of function keys that are used with both the notepad and the appointment calendar. The function-key table proves fairly useful for a quick reference.

It is fortunate that the documentation is as concise as it is, considering that Whiz doesn't have any on-line help to speak of. The main menu lists the available modules; but you can't call them from within the main menu by cursor controls as you would expect. Instead, they are are invoked separately with BREAK-# combinations.

There are no configuration options; so, like Perks, Whiz is quick and painless to install. Unlike Perks, however, once you load Whiz you can't unload it. As with Informer, you have to reboot to get rid of Whiz.

Notepad jottings

Whiz has the most limited notepad buffer of the four programs. A single 40-line by 79-character buffer is all it gives you. Furthermore, the notepad window displays only ten lines of 58 characters. Having to move the window over just to see the last 21 characters of each line is awkward. A buffer of 53 lines of 60 characters each would probably be more workable. Expanding the window to the width of the screen is another possibility. That way you could see all 79 characters in each line without moving the window.

The notepad and the other four windows can be moved at will. Unfortunately, you can't go from one window to the next without closing the first one. Thus, a situation such as the following can easily occur:

You have all five windows displayed and are now in the calendar window. After looking at your appointments, you want to use the notepad to jot a quick note about one of them. If the notepad window was the first window you opened, you have to exit from each one of the other four windows in the reverse order you entered them, closing each one behind you, to get back to the notepad. By the time you get to the notepad and are ready to write, you may have forgotten what it was that you wanted to note about that appointment.

Whiz's editing power is limited, but completely adequate for such a small buffer. It uses the built-in edit keys, so there's really no learning necessary to start typing memos.

Whiz handles buffer overflow well. When you try to read in a file that is too long, the notepad scrolls through it until it reaches the end; then it stops, leaving the last 40 lines in the buffer. It would be nice if it displayed the file screenful by screenful; but at least you can stop its scrolling motion with CTRL-S and restart it with CTRL-Q, just as you'd expect.

However, Whiz doesn't handle set high bits or CTRL-characters very well. The notepad will gag on them.

Notepad files can be output in ordinary ASCII to disk, but not directly to your printer.

Calculator figures

Out of the five electronic desktops I examined, Whiz seems the one most tar-

One for the H8 and '89

For the H8 or H/Z89 running CP/M, Write-Hand Man (WHM) is a creation of Alan Bomberger, and is offered by Technical Micro Systems, Inc., (TMSI) for $49.95.

If you forego restoring the foreground program's display, WHM.COM squeezes into 1.5K; 5K gives you redisplay on exit from WHM. (Your program won't know the difference.)

WHM comes with a small notepad, two calculators (one floating-point decimal, the other integer hexadecimal/decimal), a 14-day calendar, and an address book. You can view files and do DIRectories.

The various modules are stored on disk as .REL files: code produced by a relocating assembler such as Microsoft's M80. If you have one, you can write additional modules of your own.

Regarding limitations, WHM's modules are small; only a 14-day calendar, for instance. Additionally, when you exit WHM, graphics characters on screen will be shown as reverse-video lowercase characters.

That inability to cope with terminal-control characters can cause a hang up. (It's being worked on.)

The documentation takes the time to point out WHM's limitations. The manual seems to cover everything, but it's brief. And it's straightforward. (I understood it!)

—John Walker

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geted at the business user rather than the programmer. This shows in several ways, one of which is the simple design of its calculator.

The first thing that you notice about Whiz's calculator is the bare-bones display. It has no fancy graphics, just one line loaded into the notepad or calendar windows. Furthermore, the calculator operates only in decimal. It has no hexadecimal, octal, or binary modes. It also uses infix notation and limits its display to six decimal places after the floating point. There are no memory functions.

In spite of its simple design, the calculator comes with thirteen built-in arithmetic functions, ranging from sine and cosine to natural anti-log. These are called by typing a three- or four-letter abbreviation, followed by the number in parentheses. For example, SQRT(27) gives you the square root of 27.

Although the built-in functions are handy, the calculator is handicapped by having no memory functions. Having to invoke the calculator with F2 for each individual calculation only aggravates the situation.

You can export your calculations from either the notepad or calendar, depending on which window you loaded the calculator into.

Calendar pages

Speaking of stripped-down features, Whiz's calendar is another good example. It contains no monthly calendar display, just a line at the top of the daily appointment calendar showing you the date.

The 10 lines of 40 characters in the appointment calendar are not already marked off by hours or half-hours. You have to enter the time yourself. The keys you use to enter this information are the same ones you use in the notepad, plus some additional ones to move around by days, weeks, and months. You can also type in the exact day you want, anything from January 1, 1980, to well into the 22nd century.

There are no apparent limits on the number of appointment files you can have other than the amount of disk space available on the disk in your default drive.

Whiz automatically saves the data you enter in each appointment file and indexes it by date. If you clear the appointment file to blank spaces, Whiz deletes it from your disk.

Bells and whistles

This is a short category for Whiz. Considering how spartan the rest of the program is, would you expect anything else?

Whiz has no address book, no search functions, no operating-system commands, and only one alarm clock. Even the alarm is limited to a one-time, ten-second appearance. However, this simple approach may actually be the best one when it comes to the alarm. Ten seconds should be long enough to get your attention, and since it shuts off automatically, you don't have to remember some obscure command to turn it off.

A full, 256-character ASCII chart comes with Whiz. As with Genie, the ASCII codes are displayed 16 at a time in a single column that you scroll through with the up/down arrow keys. This feature is the only one that seems slightly out of line with the rest of Whiz's features, since it seems aimed at the programmer more than the business user.

Program compatibility

Remember that list of six requirements for a productive desktop utility program? The preceding detailed discussion of each of the programs should answer the first five questions, but there is still the sixth one, compatibility with the foreground program.

To help with that question, I tested the five utilities with some popular programs: dBASE II, Graftalk, Lotus 1-2-3, Multiplan, Palette, Reactor100, WatchWord, and Z-BASIC (both with and without graphics).

The results are shown in Table 2. There, a "yes" indicates that the desktop utility, including import and export functions, appears fully compatible with the application program listed on the left.

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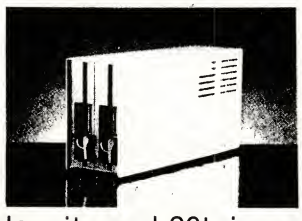

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application programs could co-exist peaceably, but that the import/export functions didn't work.

A "no" means just that—the programs are incompatible. Either I couldn't invoke the desktop from within the application program, or upon exiting the desktop, the application program's display or data was garbled.

Although compatibility is the most important question, sheer logistics make it impossible to answer it completely. Table 2 attempts to give you some idea. However, only *you* know what foreground programs you'll use a desktop utility with.

There are, though, several areas where problems tend to develop.

First, a few programs, among them Lotus 1-2-3, "trap" most of the keyboard output. These programs are known as event-driven, since they respond directly to the keyboard input without going through the central processing unit (CPU).

Thus, an ESCape code used to invoke a resident desktop utility might not get through to the CPU. If this happens, you may never be able to call up the resident program from within that foreground program—unless you can alter the invocation key, that is. Out of the five electronic desktops I examined, only Informer and Whiz lacked this ability and thus proved completely incompatible with Lotus. (See Table 2.)

Programs like Lotus 1-2-3, Graftalk, and Palette may also cause problems when they write directly to the video RAM, bypassing the computer's operating system and read-only memory (ROM) in order to use their own character fonts and graphics. This creates havoc when it comes time to restore the foreground screen upon exiting—because the computer has no way of restoring the special fonts and graphics. Obviously, you also cannot import such characters or graphics into a desktop program.

In Table 2, the video RAM problems are taken into account. I don't expect to be able to import graphics, for instance. However, if I try to, I expect the program to at least leave the screen display alone. Informer was consistently bad in this respect—although 64-kilobit video chips may help somewhat.

Even if the foreground program doesn't bypass the operating system and ROM, the desktop utility may still have problems with saving and redisplaying the screen after you exit it. It takes a lot of memory to store all those pixels, more so if they're in color.

Alarms and screen-saving devices interrupt a program—sometimes permanently, forcing you to reboot. Or they may just garble the screen data. In my version of Genie, the alarm did both to Lotus 1-2-3's screen. Informer's alarm also had a minor problem with Lotus 1-2-3. It couldn't be turned off.

	Genie	Informer*	Perks	RHM	Whiz
dBASE II	partial	no	partial	no	no
Graftalk	yes	no	yes	yes	partial
Lotus 1-2-3	no	no	partial	partial	no
Multiplan	yes	yes	yes	partial	yes
Palette	yes	no	yes	yes	yes
Reactor100	yes	no	yes	yes	partial
WatchWord	yes	no	no	yes	yes
Z-BASIC w/out graphics	yes	yes	yes	yes	yes
Z-BASIC w/graphics	yes	no	yes	yes	no

*Installing 64-kilobit video RAM chips in your computer, as Sunflower Software suggests, may allow Informer to work with some of the programs listed as incompatible.

Table 2. Compatibility between the five desktop utilities reviewed and some representative applications programs.

Finally, too little memory can make it look as though the desktop utility is not compatible with your application program, even though it really is. You might get a flashy error message such as "Wild Interrupt"; then, again, your operating system may just become comatose. (This happened to me several times while using a machine with only 192K of RAM. When I used 448K, most of these problems vanished.)

You can minimize these compatibility problems in three ways: install 64-kilobit video RAM chips (in the case of Informer); stick to better-known products; and install enough memory. Although all the programs are supposed to work with only 192K of RAM, a 256K minimum is probably a better bet.

The winner?

Well, you may have guessed it. I'm not going to rank the desktop utilities in order, 1-2-3-4-5. Nor am I going to give them stars, or little floppy disks, or anything. It's not that I wouldn't rather use one program rather than the next—it's just that the reasons I like that program might not be important reasons to you.

Each of the five desktop utilities has its own unique blend of strengths and weaknesses. To help you sort things out, here is a quick summary of what I consider the best and worst features of each.

Genie

Praise: Genie has the most complete range of modules and allows the most customization, a definite plus. The address book and its search functions are a useful addition. The adjustable text-buffer size and overflow-handling ability are other features that you won't want to do without once you try them.

Genie appears very compatible with foreground applications programs. And you can unload it without rebooting, although this was more difficult than one might like.

Gripes: To put it bluntly, Genie is a memory hog. That's to be expected, since it offers you so many choices; but it took considerably more space to load the same options that the other desktop utilities came with. The documentation I received with my version was very outdated. The integer calculator that shattered when moved too far to the right is a very noticeable bug. The spreadsheet-garbling alarm was another. It also took too many keystrokes to move through the clunky menus that ran the calendar module.

Informer

Praise: The best thing Informer has going for it is the very little RAM it needs, only 26K. The address book and its search functions also worked nicely. Informer is also one of the two desktop utilities that comes with an autodialer for a modem.

Gripes: The biggest has to be Informer's inability to work with many other programs (at least without 64-kilobit video RAM chips). Informer also seemed to need the most disk-accessing to run. You couldn't even call up the Rolodex, appointment calendar, or notepads if the proper disk wasn't available.

Other minuses include: no way to unload it without rebooting, Reverse Polish notation on the calculator, no separate calculator display, and the lack of windows.

Perks

Praise: Perks gives you a lot of bang for your byte, especially when it came to the notepad with WordStar commands. The on-line help was second only to RHM. The two-keystroke unloading ability (under MS-DOS) was nice.

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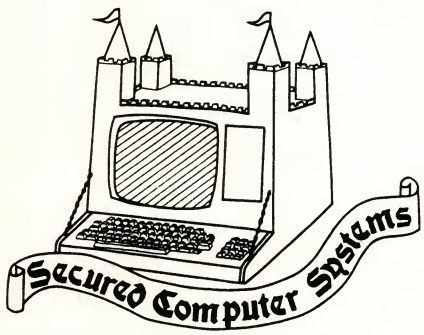

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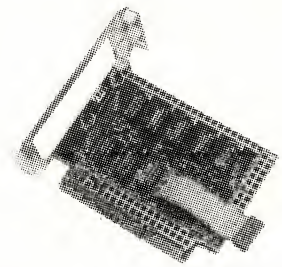

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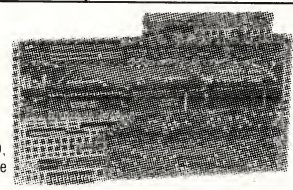

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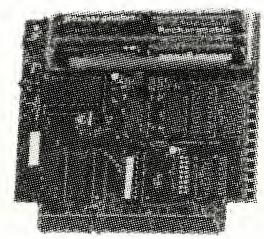

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Desktop Utilities—Behind the Scenes

Most of the time when I have reviewed software, I have taken a quick peek at the documentation and then explored the program, bit by bit, at my own pace. If I have had any questions, as I often have, one phone call before the review has gone to press has usually sufficed.

Reviewing the desktop utilities was different.

Like most software, the desktop utilities are constantly evolving. However, the pace of evolution is drastically different, often being measured in weeks.

That, in combination with our relatively long lead time at *Sextant*— remember, we're an every-other-month magazine—means that the version you get will probably be different from the one I reviewed.

Most of the changes will probably be slight, patching up a bug here or there. However, some additional features may also have been added.

I got a chance to talk to all five software authors face to face at HUGCON 4, something I have seldom had the opportunity to do. Among other things, I asked the authors about future enhancements to their programs.

All five authors said they were considering additional features—although none of them wanted to specifically commit themselves in print. I can, however, list the following as developments to watch for:

"Rolodex" utilities. Those programs without address-book utilities at the time of this review will probably add them—most likely in conjunction with an autodialer for a modem.

Utilities that emulate the operating-system features. Once again, these are likely to be added if not already present, or further enhanced if they are—perhaps with things like a query on delete or copy.

Compatibility. This will be an ongoing struggle. You should see improved compatibility with application programs as problems are discovered and corrected.

Memory. Any programs that were inefficiently written will be pruned to cut memory requirements to a minimum. For example, we were told in November, two months after this article was written, that Genie has been revised to trim its memory by as much as 40% in some configurations.

Customization. Look for more customization options to appear—especially ones that allow you to save memory by dropping any modules you don't need.

Price. There was an intensity of competition among the authors I hadn't encountered before. *They* contacted *me* instead of the other way around. "How would you rate them?" was a frequent question.

The pricing has already begun to reflect this competition. For instance, Perks originally sold for $99.97; it is now $69.95, about the same as the others. I wouldn't be surprised to see a further slight drop in prices as interest in these products continues to heat up.

And for those H/Z100 users who don't have MS-DOS 2, Perks's best feature, no doubt, is that it runs under Z-DOS as well.

Gripes: Its lack of an address book might prove a hindrance to the business user. The inability to delete appointment files could prove a pain. The WordStar editing commands seemed much too powerful for Perks's 4K text buffer. The two little bugs, one in the calendar setup and the other in the expanded notepad, that wrote garbage to the screen were also irritating.

Right Hand Man

Praise: One of RHM's best features has to be its excellent on-line help—the best out of the five programs. It even includes a self-executing demonstration to take you through all the modules for the first time. RHM also comes with a good configuration program.

The compact size of RHM, 48K with the default module sizes, is a big plus. I also liked being able to set the alarms in conjunction with the appointment calendar. The user-definable macro keys are a definite plus. Other nice features include: the adjustable text-buffer size, and the search and autodial capabilities of the address book.

Gripes: The version I originally received had a bug which forced you to reboot when it tried to handle text-buffer overflow. The calculator display takes some getting used to. The limitations in the address book's search function reduced its usefulness considerably. To some users, RHM's inability to display more than one window at a time may prove a hindrance.

Whiz

Praise: Whiz handles notepad buffer overflow pretty well. The built-in arithmetic functions were also a plus. Perhaps Whiz's most appealing feature is its simplicity—you won't get lost in it.

Gripes: The notepad window's small horizontal dimension works awkwardly with the notepad's larger size. It was difficult to move from module to module within the program. Whiz also lacked a separate calculator display, a way to unload the program without rebooting, and adequate on-line documentation.

Still undecided?

So there you have it. To pick the right desktop utility for you, first figure what features you need and what you can do without. By all means try out the program before buying it, at a friend's or a nearby Heath/Zenith store.

Make sure you at least ask about compatibility with your favorite software, if you don't actually try it out.

Price shouldn't be too much of an issue. All of the offerings I examined were reasonably priced—just take a look at similar stuff for the IBM Personal Computer.

Finally, remember that desktop utilities are still in their teething stage. The features available, and the number of bugs, vary from version to version, and sometimes even from one day to the next.

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212/247-0150

Informer (Z100 or Z150 with Z319 card, MS-DOS 2), $69.95.
Sunflower Software
13915 Midland Drive
Shawnee, KS 66216
913/631-1333

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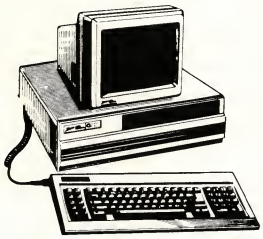

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DISCOVER is a game of skill and knowledge of slogans and phrases. It is written in Microsoft BASIC for use under the CP/M operating system.

DISCOVER is modelled closely after the popular television game show *Wheel of Fortune*. You are shown a string of small graphics-character circles interspersed with spaces to indicate some commonly known phrase or slogan. Since circles have been used to replace each letter in the phrase, only the structure is known—word length, number of words, and apostrophes if present.

You must then attempt to determine the words by guessing which letters might be present within the phrase.

Other than apostrophes, no punctuation marks are used or accepted. As you input a letter, the phrase is searched to see if a match is found. If so, each circle "covering" that letter is removed, leaving the correctly guessed letters in place.

When a sufficient number of letters have been uncovered that you think you have DISCOVERed the phrase, you can type in your guess. If correct, you are rewarded, and if not, you are penalized.

Each phrase is given a value based upon its length, and each reward or penalty is a portion of that value.

What you see

An example of a screen display might be:

●●●●●'● ●●● ●●●●

If your first try was an "E", the display would change to:

●●E●E'● ●●E ●EE●

Even if correct, each character you try costs a small amount. (See below for particulars on scoring.)

After other matches have been made, a correct guess would be:

WHERE'S THE BEEF

Raymond Dotson is a Zenith Data Systems dealer right outside the main gate of Seymour Johnson Air Force Base in Goldsboro, North Carolina.

```
100 C$=CHR$(27):Y$=C$+"Y":J$=C$+"j":K$=C$+"k":X1$=C$+"x1":Y1$=C$+"y1":
      X5$=C$+"x5":Y5$=C$+"y5":EEL$=C$+"K":F$=C$+"F":P$=C$+"p":Q$=C$+"q":
      G$=C$+"G":CLP$=C$+"J":CL$=C$+"E":BEEP$=CHR$(7)
200 RANDOMIZE PEEK(11):DEF FND$(V,H)=Y$+CHR$(31+V)+CHR$(31+H):WIDTH 255:
      PRINT CL$X5$FND$(4,32)"DISCOVER THE PHRASE!":PRINT:ON ERROR GOTO 2900
300 N=1:DEFINT L,P,T:OPEN "I",1,"DISCOVER.NFO"
400 IF EOF(1) THEN A$=INPUT$(1):GOTO 500 ELSE LINE INPUT #1,A$:PRINT A$:GOTO 400
500 CLOSE:DIM S$(80),ST$(80),U(80):OPEN "I",1,"DISCOVER.DAT"
600 IF EOF(1) THEN N=N-1:CLOSE:GOTO 800  '       CLOSE WHEN EMPTY
700 LINE INPUT #1, ST$(N):N=N+1:GOTO 600   '     GET ONE MORE LINE
800 ON ERROR GOTO 3700:FOR I=1 TO N:X=1+INT(N*RND(1))   '   SHUFFLE ROUTINE
900 Y=1+INT(N*RND(1)):IF Y=X THEN 900  '         MIX 'EM UP
1000 SWAP ST$(X),ST$(Y):NEXT:Y=1   '             THAT DOES IT!
1100 ST$=ST$(Y):Y=Y+1:IF Y>N THEN 3100   '       NOW TO SELECT A DATA LINE
1200 PRINT X1$FND$(6,1)CLP$:TT$=ST$:L=LEN(ST$):L0=L:Q=(80-L)/2:
      PRINT FND$(12,Q+1);
1300 FOR I=1 TO L:S$(I)=MID$(ST$,I,1):U(I)=I:
      IF S$(I)=" " THEN PRINT " ";:L0=L0-1 ELSE
      IF S$(I)="'" THEN PRINT "'";: ELSE PRINT F$"^"G$;  '    AND PRINT IT
1400 NEXT:POINTS=INT(L*10):LOSS=INT(L/2)   '          VALUE BASED ON DIFFICULTY
1500 POINTS=INT(POINTS-LOSS):GOSUB 2800:IF L0 THEN 1700 ' DECREMENT FOR EACH TRY
1600 PR$="":FOR G=1 TO 300:PRINT BEEP$;:NEXT:GOTO 1100  '        NOISY DELAY
1700 A$=INPUT$(1):IF A$=" " THEN 1700   '        TRY A LETTER, IGNORE SPACES
1800 IF A$="?" THEN 2300   '                       ?    HAZARD A GUESS
1900 IF A$=CHR$(13) THEN TOTAL=INT(TOTAL-POINTS/10):
      PRINT FND$(13,Q+1)BEEP$P$TT$Q$:FOR V=1 TO 1400:NEXT:
      PR$="":GOSUB 2700:GOTO 1100  '             TOO TOUGH, TRY ANOTHER
2000 IF A$=C$ THEN 3100   '                      ESCAPE!  HE WANTS TO QUIT
2100 I=INSTR(ST$,A$):IF I=0 THEN 1500  '         CHECK FOR LETTER MATCH
2200 PRINT BEEP$FND$(12,U(I)+Q)S$(I):MID$(ST$,I,1)="|":L0=L0-1:
      GOTO 2100   '              IF CORRECT THEN PRINT IT AND REPLACE IT
2300 PRINT Y5$FND$(16,36)"YOUR GUESS: ":PRINT FND$(13,Q+1)J$;:
      LINE INPUT GUESS$:PRINT X5$;   '                LET HIM GUESS
2400 IF GUESS$<>TT$ THEN TOTAL=TOTAL-POINTS/2:
      SOL$="Sorry, "+GUESS$+" was incorrect!":SOL=LEN(SOL$):
      PRINT FND$(8,(80-SOL)/2)SOL$:GOSUB 2700:PRINT K$CLP$:GOTO 1500
2500 PRINT FND$(12,Q+1)CLP$P$TT$Q$  '            IF CORRECT THEN PRINT IT
2600 PRINT:PRINT TAB(30)"CORRECT! "POINTS"POINTS!!":
      TOTAL=TOTAL+POINTS:GOSUB 2700:GOTO 1600   '    CALCULATE SCORE
2700 PRINT Y1$X1$FND$(25,33)"TOTAL"TOTAL"POINTS"FND$(12,1);:
      RETURN'                                   PRINT SCORE ON 25th LINE
2800 PRINT FND$(25,6)"VALUE"POINTS:
      IF POINTS<1 THEN PRINT FND$(12,Q+1)CLP$P$TT$Q$:GOTO 1600 ELSE RETURN
2900 IF ERL=300 THEN CLOSE:RESUME 500   '        CONTINUE IF NO NFO FILE
3000 IF ERL=500 THEN CLOSE:PRINT CL$Y5$FND$(8,31)"No Data File Found!":
      PRINT:GOTO 3700
3100 PRINT K$CL$Y1$Y5$FND$(8,33)"TOTAL "TOTAL"POINTS":
      PRINT:PRINT:PRINT:   '                                    CLEAN UP
3200 IF TOTAL=0 THEN 3700 ELSE ON ERROR GOTO 3800
3300 OPEN "I",1,"SCORE":INPUT #1,ALL,NAM$:CLOSE  '       READ THE OLD SCORE
3400 IF ALL>TOTAL THEN
      PT$=NAM$+" is still Champ with a score of"+STR$(ALL)+" Points!":
      PRINT FND$(12,(80-LEN(PT$))/2)PT$:PRINT:PRINT:GOTO 3700 '   SAD NEWS
3500 PRINT TAB(17)J$TOTAL" is a record!  What is your name? ";:LINE INPUT;NAM$
3600 OPEN "O",1,"SCORE":WRITE #1,TOTAL,NAM$,:CLOSE:PRINT K$EEL$
3700 WIDTH 80:PRINT BEEP$TAB(36)"DISCOVER":PRINT:
      PRINT TAB(28)"Copyright (C)  Feb. 1984":
      PRINT TAB(31)"by  Raymond Dotson":
      PRINT TAB(29)"214  S. Berkeley Blvd.":
      PRINT TAB(30)"Goldsboro, NC  27530":
      PRINT TAB(33)"(919) 778-4112":PRINT:END
3800 IF ERL=3300 AND TOTAL>0 THEN CLOSE:RESUME 3500
3900 RESUME 3700
```

Listing 1. DISCOVER.BAS **is written for Microsoft BASIC running under the CP/M operating system. Operating much like the television game show *Wheel of Fortune*, it will present the player with a line of graphics-character circles interspersed with spaces. This represents one of a number of phrases stored in the file** DISCOVER.DAT **(Listing 2). The player can attempt to guess the phrase and then move on to guess the others.**

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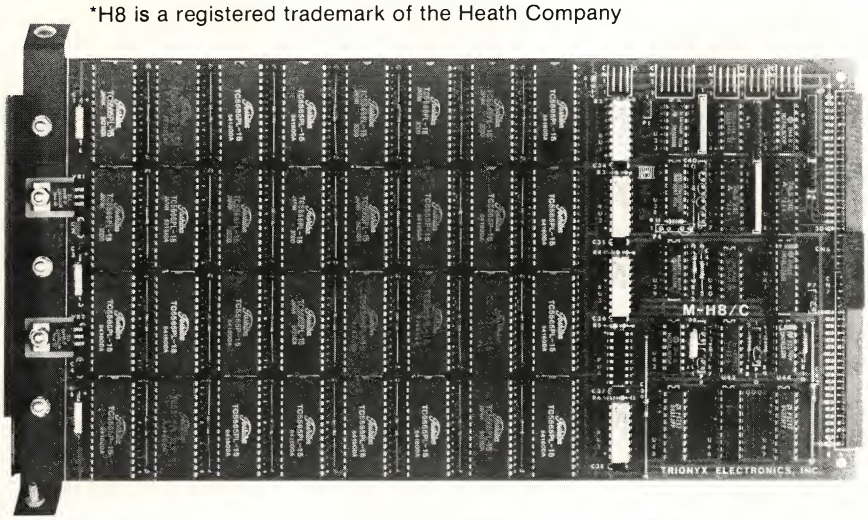

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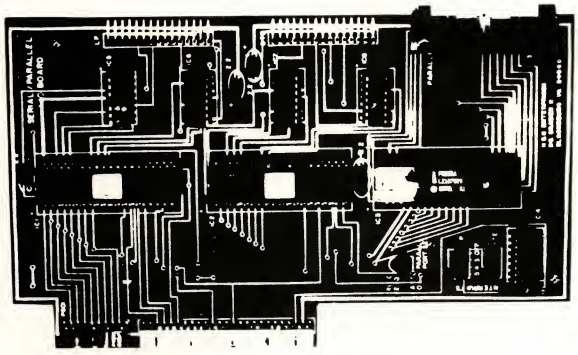

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which would be rewarded with an addition to your total score.

Each incorrect attempt at guessing the entire phrase exacts a rather severe penalty: half the remaining value of the phrase.

The program will display your running point value as you attempt to DISCOVER a phrase. Also, a score-keeping system is used to notify you if you have the all-time high score or to tell you who does and what the score was.

And perhaps the last consideration is that you've got to guess to get any points! Hit the question mark, then give the whole phrase—just as on the game show. (If you just fill in all the letters one by one, the program will take you to the next phrase without giving you any credit at all.)

What you get

DISCOVER.BAS is given in Listing 1. It accesses three other files: DISCOVER.DAT (Listing 2), DISCOVER.NFO (Listing 3), and SCORE.

DISCOVER.DAT, a data file of phrases, is required for DISCOVER to operate. However, you may make changes to Listing 2 or replace the entire file with one of your own selections. Any available editor may be used to create or modify the file. You may wish to use an entirely different list. That is your prerogative.

The only requirement for DISCOVER.DAT is that it be written in all uppercase letters, one complete phrase per line of 80 characters maximum.

Using these additional files provides one way to modify the program very easily. For example, if you do not wish to have a listing of instructions at the beginning of each session, merely delete or rename the file DISCOVER.NFO. If at any time you wish to start a new SCORE file, merely erase the existing one and a new file will be created automatically at the end of the first session.

I trust that you will enjoy DISCOVERing how proficient you are at uncovering hidden slogans and phrases.

Going by the numbers

As noted, DISCOVER was written for use with H/Z89 computers with the CP/M operating system and MBASIC. And it works nicely on a Z100 under CP/M-85. For use on other computers, some slight modifications will be necessary.

To facilitate any changes you may need to make, and to explain some programming techniques used, REMarks are included frequently throughout the program. Some additional comments are included here to explain the numerous terminal codes and graphic symbols utilized.

Throughout, I have tried to keep the code as compact as possible, while still keeping the game effective. For instance, you'll note that I wrote the program on the assumption that both player input and the .DAT file would be in all uppercase letters. This keeps the program more like the game show—and coping with a mixture of upper- and lowercase letters would needlessly complicate both the game and the program. As we go through the program, I'll note a couple of areas where someone might want to add code.

In line 100, we designate the variable C$ as the ESCape code; Y$ is used for direct cursor addressing. J$ saves the current cursor position, and K$ is the code used to return to the saved position.

X1$ enables and Y1$ disables the 25th line, while X5$ and Y5$ turn the cursor on and off. EEL$ erases to the end of the current line. F$ puts our terminal into the graphics mode and G$ takes it out; P$ enters and Q$ exits reverse-video mode.

Each incorrect attempt at guessing the entire phrase exacts a rather severe penalty.

```
DON'T BITE THE HAND THAT FEEDS YOU
GET THAT PEPSI FEELING
COKE IS IT
SMOKE GETS IN YOUR EYES
DON'T PUT ALL YOUR EGGS IN ONE BASKET
TO BE OR NOT TO BE
THE QUICK BROWN FOX
GOOD TO THE LAST DROP
DON'T COUNT YOUR CHICKENS BEFORE THEY'RE HATCHED
WHERE'S THE BEEF
WHEN IT RAINS IT POURS
ALL THAT GLITTERS IS NOT GOLD
A PENNY SAVED IS A PENNY EARNED
A PRETTY GIRL IS LIKE A MELODY
LOOK BEFORE YOU LEAP
FOR WHOM THE BELL TOLLS
WHERE THERE'S SMOKE THERE'S FIRE
FORGIVE AND FORGET
MUCH ADO ABOUT NOTHING
THE SOUND AND THE FURY
GIVE ME LIBERTY OR GIVE ME DEATH
TEMPEST IN A TEAPOT
THE LAND OF THE FREE AND THE HOME OF THE BRAVE
INTO EACH LIFE SOME RAIN MUST FALL
MY COUNTRY 'TIS OF THEE
REACH OUT AND TOUCH SOMEONE
FROM SEA TO SHINING SEA
EVERY CLOUD HAS A SILVER LINING
THE BEST LAID PLANS OF MICE AND MEN
A ROLLING STONE GATHERS NO MOSS
THE GRASS IS ALWAYS GREENER
ALL WORK AND NO PLAY MAKES JACK A DULL BOY
GO WEST YOUNG MAN
GRAB THE BRASS RING
WHEN IN THE COURSE OF HUMAN EVENTS
FOURSCORE AND SEVEN YEARS AGO
ALL'S WELL THAT ENDS WELL
YOU CAN'T MAKE AN OMELET WITHOUT BREAKING EGGS
SING A SONG OF SIXPENCE
THERE WAS A CROOKED MAN
```

Listing 2. A sample DISCOVER.DAT file containing phrases to be accessed by DISCOVER.BAS (Listing 1). This is an ordinary text file with each phrase on its own line, in all uppercase.

CLP$ clears the screen from the current position to the bottom and CL$ clears the entire screen. BEEP$ rings the terminal bell.

In line 200, PEEK(11) peeks at the tic counter (which is incremented every two milliseconds). This gives us a seed to be used by the RANDOMIZE function. Next we DEFine a user function to permit us to go to line "V" and column "H" for direct cursor addressing.

Line 300 opens the file DISCOVER.NFO for reading. When you no longer need the instructions, simply RENname this file to something different. The program will no longer stop for this printout. (See line 2900.)

Line 500 DIMensions arrays to hold up to 80 strings in variables S$ and ST$ and up to 80 numbers in variable U. Then we open the data file. If no data file is found, you will be so informed and the program will end. (See line 3000.)

Lines 800-1000 constitute a very simple shuffle routine to mix up the order of the data lines so that they will not appear in the same sequence each time the game is played.

Line 1100 will step us through the reshuffled data file.

Line 1200 clears the screen from line 6 downward, measures the length of the data line, and determines the horizontal position at which to print the line to keep it centered. The cursor is then moved to this point.

Line 1300 looks at the phrase a character at a time and checks for spaces and apostrophes. If either is found, it is printed. Otherwise, the program prints a round graphics character—the graphics equivalent of the caret (^).

This routine prints the data string as a series of graphic circles, spaces, and apostrophes. Thereby, it conceals the true characters but still allows us to see the individual word lengths.

Line 1400 assigns a value to the phrase based upon its length. POINTS is given a value equal to ten times the number of character spaces (including spaces and apostrophes) in the phrase.

Each guess at individual characters will cost you half a point per character space in the phrase. (LOSS is rounded up by INT to ensure you get a whole number.)

To keep the code compact, LOSS is deducted from POINTS even at the very beginning. So WHERE'S THE BEEF, above, has a total POINTS value of 160; but you'll start out with a value of 160 minus 8, or 152. (Unless you want to add some code, you can explain that there's always a cost, even just to play the game!)

Lines 1700-2000 input a single character from the keyboard. They determine what action you wish to take. Hitting the "?" signals you wish to guess the phrase. You can hit RETURN (ASCII value 13 decimal) in order to display the phrase

```
This is a Word Completion Game where the letters
 of a familiar slogan or phrase are replaced by
 dots.  It is your task to try and find enough
letters to be able to guess the phrase represented.
Your score will be determined by the number of letters
    you found before a correct answer was given.

Just enter your choice of letters and if appropriate.
     they will be inserted in the proper places.

          Hit "ESC" to Quit
       Or any Letter you choose
       RETURN  for A New Phrase
         "?" to enter a Guess


          NOW Hit any Key!
```

Listing 3. DISCOVER.NFO can be accessed by DISCOVER.BAS (Listing 1) to provide a set of instructions for the user. Its use is optional; in its absence, DISCOVER.BAS will simply proceed with the game.

and move on to the next one. Or you can quit by hitting the ESCape key.

Line 2200 rings the bell if your input character is found within the phrase. The corresponding graphic circle on the screen is replaced with the input character, and that character in the search string (ST$) is replaced with the vertical-bar character (|).

As you can see from reading line 2200, you'll send DISCOVER into an endless loop by inputting a vertical bar after it has placed one in ST$. That's not very likely; but if you wanted to bulletproof this for kids to play, you might add code to filter out the vertical bar—and anything else except uppercase letters, spaces, and apostrophes.

After taking care of the matching character, the program returns to line 2100 to check for any additional matches. When no further matches are found, the program returns to line 1500 for another try.

If, in line 1800, you had input a "?" indicating you think you know the phrase and wish to try, the program would jump to line 2300. Here you type the phrase you think will match.

Line 2400 penalizes an erroneous attempt to guess the entire phrase. Your overall score (TOTAL) will be charged one half the remaining POINTS value for the phrase.

Lines 2500-2600 add points and notify you of a correct guess.

Line 2800 prints your running score on the screen's 25th line. In addition, it monitors the score to see if you have used all the allotted points. If so, the correct phrase is printed for your information, and a new phrase is selected for another try.

When you have used up all the phrases, or when you cry "Uncle" by hitting the ESC key, the routine starting at line 3300 prints your final total and checks to see if a file exists labelled SCORE.

SCORE is a one-line file containing just the score and name of the DISCOVER player with the highest score. An example of a SCORE file might be

1426, "RAY DOTSON"

If no SCORE file is present on disk, DISCOVER.BAS will create one at the end of the first game.

If SCORE is found, the previous high score and the champ's name is extracted. Your score is compared to the old high score. If yours is greater, you are asked for your name and a new file is written. If not, you are told who is still champ and the current high score.

However the program is brought to an end, line 3700 cleans up, shows the credit lines, and ends.

(If you don't like entering code, or if you'd like a compiled version of DISCOVER, please send $6 and a *formatted* 5¼" disk in H/Z89 hard- or soft-sectored format to the address below.)

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C Notes

Joseph Katz

Hello, world!

This column is about the C programming language on Heath/Zenith microcomputer systems.

I'll try not to exclude any system for which a C compiler is available. That goal is reasonable as well as desirable because C is an extremely portable language. Since it *is* so portable, much of what goes on here will apply if you use any "standard" implementation of the language on almost any computer. The focus here, however, is on Heath/Zenith systems.

Of course, I'll also try to have something here for everyone interested in C, but tutorials will be aimed at novice programmers. Any full C compiler ought to handle most of those examples. If anything is compiler-dependent, I'll say so. And if a work-around or change in syntax will increase portability, I'll give it.

You'll also find news, tips, short programs, libraries—anything relevant to C, and especially to C on Heath/Zenith microcomputers. I'll keep my eye out for development tools like editors, debuggers, and commercial libraries; for information sources like books, magazines, and organizations; and, naturally, for compilers. Incidentally, I intend to keep up with version changes if I can: oftentimes a "minor" revision includes just the bug fix or new feature for which you were hoping. Although I'll pass on some information from press releases, my product judgements will be based on using just what you would get if you buy: I won't recommend from ink or demos.

I'll cast my net as widely as I can. If, over a period of time, you find a great deal about some products but nothing about others, it's probably a sign that some vendors cooperate freely while others either have chosen not to be forthcoming, or required time in wooing I did not think worthwhile. Maybe they're signalling the kind of treatment you should expect if you buy; maybe not.

Microsoft, "No"

I wish it could be Microsoft, "Si," because I hear their version 3.0 C compiler—their first real try at C in house—is all right. (Version 2.x was Lattice C. Now the two companies are competing for your dollars.) But I spent a couple of days telephoning long distance to Microsoft Corporation, and I just couldn't find anyone who admitted to knowing what was going on. After much time and money spent to hear "Sorry, sir, that's not my table," I decided I couldn't afford an acquaintance with everyone on Microsoft's payroll. I gave up.

Guess I'll just muddle through the way people did before Microsoft entered the C market. Don't bother suggesting I should have called the president's office. If it's Microsoft's president you mean, I finally did. After getting right onto the problem—about an hour went by—they shuttled me to someone who tried shuttling me to someone else again. That's when I quit. Should the situation ever change, I'll let you know.

HELLO.C

It's the traditional first program—the one to acquaint you with the way a C program looks and the way a C compiler works. Snoop over the shoulder of a C programmer initiating a new compiler and chances are that what will be pecked out is:

```
/*
**HELLO.C--says hello on the console
*/
#include <stdio.h>
main( )
{
printf("Hello, world!\n");
}
```

Except for being the equivalent of a graphic artist's doodling to break in a new pen, HELLO seems useless. But it does have the potential to teach some things about C and the individual compiler.

All the program accomplishes is to write "Hello, world!" on the console and advance the cursor to the beginning of the next line. The cursor advance is done by the escape character "\n"—the "newline."

The newline and other escape characters deserve looking at. They're potentially tricky, so they're fun to explore. Not now, though.

Now you should recognize that the reason for the newline in HELLO.C is the use of `printf( )` to output the greeting. It's the function used for *formatted* console output. Because its choice implies you want total control, it assumes nothing: If you want the cursor advanced to the first column of the next row on the CRT—which is what the newline does here—you have to say so.

You *don't* have to say so if you use `puts( )` instead. Unlike `printf( )`, `puts( )` automatically appends a newline to the end of anything. Therefore HELLO.C might as well be written this way:

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Table 1. Printer device names required by some popular compilers.

```
#include <stdio.h>
main( )
{
puts("Hello,'world!");
}
```

What happens on the console looks the same as when the traditional version is run. Try HELLO both ways to see.

Let's push a little further.

Check the size for each version of HELLO in the directory. The one with `printf( )` is substantially bigger than the one with `puts( )`, isn't it? That's because `printf( )` has to carry the overhead for thoroughly formatted output whether or not you use any formatting at all.

In the case of HELLO, or any other program in which strings are output to the console unformatted except for a new line, `printf( )` is wasteful. More economical is `puts( )`.

Now let's push further still.

A misinterpretation of what I've been saying might lead to the following version of HELLO.C:

```
#include <stdio.h>
main( )
{
printf("Hello, ");
puts("world!");
}
```

Run HELLO done that way and the console will show you just what you saw the other two times.

It's possible to think this version the most economical of the three. After all, `printf( )` is doing what it does cheaply and `puts( )` is performing its low-paid job. Unfortunately, that's not the way things are.

Check the directory for the file size of this HELLO. Depending on your compiler package, chances are this version is somewhere in size between the first version and the second. Here, obviously, you didn't use and didn't pay for the newline, so you've saved at least some space used by the first version. (Obviously, too, `puts( )` must handle new lines differently from `printf( )` with a newline.) By using two functions, however, you've wasted the space that one use of the more economical `puts( )` would have saved.

Of minimum program size

We've been talking about "optimizing" code: making it produce the most efficient program possible. When quick-and-dirty is good enough, optimization misses the point. If someone has to live with the program, however, it probably should be optimized to some extent at least.

That's expecially true if the target computer—the one for which the program is intended—has restricted storage space. Two floppy diskette drives, for example, seem to shrink the more you use them. Even with a Winchester on the system, it usually pays to optimize.

But how do you know when to stop, when nothing else you do will pay off? Put another way, how much overhead does your compiler package carry?

That's easy to determine. You do it with this program:

```
/*
** DUMMY.C--shows minimum size
*/
main( )
{
}
```

DUMMY does nothing but sit on the disk and take up space. Its only function is `main( )`, which prepares the program to do whatever it should. Since `main( )` here invokes no other functions, the program will have no effect on anything.

But you don't want to *run* DUMMY. All you want to do is use STAT (CP/M) or DIR (MS-DOS) to find out how much disk space it occupies. That's the overhead in storage space for your compiler package. Sort of.

Before we look at that qualification, you should know that different C compiler packages carry different amounts of overhead. You should also keep in mind that there are different kinds of overhead, and that reducing one kind sometimes increases another. We're only concerned with the basic overhead for disk storage space now.

The range for DUMMY is fascinating. Take the two compilers from The Software Toolworks, for example: C/80 (the CP/M version) takes only 2,048 bytes on a disk, but Toolworks C (the MS-DOS version) takes 5,930. That was the biggest DUMMY of the MS-DOS compilers I've tried. Computer Innovations' Optimizing C86 produced 4,418 bytes; Aztec C-86, 1,232; and Lattice C, 512 bytes.

"Aha," you might exclaim. "So storage overhead can be a factor to consider when choosing a compiler package!" Indeed, it is—when space is critical. Be aware, though, that DUMMY alone won't give you the information you need in order to decide well. What DUMMY measures is a combination of compiler efficiency and the functions which `main( )` was set up to support. DUMMY does not distinguish between the two.

In some packages, `main( )` itself is set up to do as little as possible. You therefore pay only for subordinate functions actually used in your program. Lattice C (Version 2, for MS-DOS) is one such, which accounts for the extraordinarily small size of its DUMMY. In other packages, `main( )` brings in support for subordinate functions whether or not you actually use them. Toolworks C and Optimizing C86 both do it, which accounts for the large size of their DUMMY.

Don't jump to the conclusion that Lattice's package is perforce better than the others. You're not going to write programs, other than DUMMY, with only the `main( )` function to support. Besides, DUMMY shows nothing about what happens to size when you do real programs.

With the information from DUMMY, what you can do now is establish the bottom line for space requirements with your compiler as it came out of the box. Later, when you know what you're doing, you can adjust `main( )` so it works most efficiently with the kinds of programs *you* write. One section in the Computer Innovations manual, for example, suggests eliminating support for the floating-point library if you don't need it.

You will need source code for the libraries to do that for your compiler. All the compilers tested supply it at no extra charge with the basic package, but for Aztec C-86 it costs extra as part of a "professional" package. If you think you will be tinkering, make sure to get it. Be sure you know what you're doing; otherwise you will derange the mechanism. And don't expect the vendor to help you fiddle

with the libraries or to heal you if you're burned by fiddling. Take care.

The C Programmers Handbook * 2

Remember Abbott and Costello's baseball routine, "Who's on First"? Here's something similar in the frenetic world of C book publishing.

Once you get beyond the early stages of learning C, you'll probably find value in a quick reference guide to features of the language such as standard functions and their syntax. You might want a quick look at `printf( )`, for example, to check on how to format a string.

Fortunately, there are two good guides of that kind. They're *The C Programmer's Handbook*.

Right. You can choose between two competing books intended to do pretty nearly the same thing, and both have exactly the same title.

Set that down to coincidence if you'd like.

Then what do you do when you learn that the two books represent one company competing with itself? For the sake of bringing some clarity to our discussion here, let's bypass the title and refer to each book by its author. One is Thom Hogan, formerly of Osborne Computer Corporation; the other is M. I. Bolsky, of Bell Telephone Laboratories. Bolsky is published by Prentice-Hall, Hogan by Brady Communications Company—which is a Prentice-Hall company. So who's on first? [Brady is now under Simon & Schuster.]

Bolsky's book is a *quick* reference guide to C on Unix System V. It's only 84 pages long, counting the front wrapper as two pages, and is aimed at helping minicomputer programmers. If you know your compiler well enough to be clear about what's not applicable in Bolsky (or if you take some time to mark up the book as you find differences), it's good for *really* quick fixes.

Hogan's book is meatier, taking great care to note exceptions and potential differences among C versions. It won't be on point in every case for *your* compiler—no matter which it is—but a few seconds' reflection will tell you it can't be. After all, there are many different C compilers for microcomputers. I think it enough that Hogan sounds the alert at possible trouble spots.

Of course, Hogan's book is more directly useful than Bolsky's for C programming on microcomputers. It's also beautifully organized in a way that can help your thinking towards an overview on C.

There are some annoying omissions in Hogan, though, and they seem unreasonable, too. Included, for example, are `fgetc( )` and `fgets( )`; but although `getc( )` is there, `gets( )` isn't. What's more puzzling is that the discussion of `scanf( )` quite properly advises the use of `gets( )` instead, in order to avoid problems in getting string input from the keyboard. If you're alert to that kind of thing, Hogan is more than simply useful. His book is almost essential.

Don't order by title alone, however.

The C Users' Group

It started as the BDS C Users' Group in 1981 and published Volume I, No. 1, of its quarterly newsletter dated June 1981. With Volume I, No. 5, it became the C Users' Group.

The newsletter is unpretentious, effective, and . . . well, "newsy." It's a newsletter, not a magazine.

In addition to the newsletter, the C Users' Group maintains a library of public domain C source code. By my count there were 47 volumes in that library as of April 1985.

As you would expect from the Group's first orientation, most volumes seem oriented towards Leor Zolman's BDS C for CP/M. (In case you've wondered, the package's title is from the company name "BD Software." Your mission, should you choose to accept it, is to find out what "BD" stands for.)

If someone has to live with the program, it probably should be optimized to some extent at least.

More recent volumes are more catholic. There's a version of ROFF4—the text formatter capable of handling scientific notations—that can be compiled with DeSmet C, for example. There also are two volumes containing the "C/Unix Programmer's Notebook," Anthony Skjellum's column in *Dr. Dobb's Journal* between September 1983 and October 1984. And there's more. A "Short-Form" catalog summarizes the offerings. Volumes are available in 8" ($8) and 5¼" ($12) formats (shipping and handling included).

The Software Toolworks, Ecosoft, BD Software, and The Code Works—four vendors of good C compiler packages—support The C Users Group. Their involvement shows the Group's increasing effectiveness in extending its reach to a variety of implementations and operating systems. It's also a nice sign of community. You might want to join too.

The C Journal

Anyone involved with C who followed the late, lamented *Softalk for the IBM PC* must have enjoyed Rex Jaeschke's column "The C Spot" in that magazine.

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Would that I had clippings of them all.

At any rate, Rex Jaeschke is editor of *The C Journal*. I don't know if I should call it a "new" journal (and it is a "journal," not a "magazine"), because by this writing there are two issues out: Volume I, Number 1 (Spring 1985), and Volume I, Number 2 (Summer 1985).

As the title says, *The C Journal* is about the C programming language exclusively. This publication is good—very good indeed. Although the second issue brought a column by Bruce H. Hunter on "C for Unix Users," the magazine's scope is C itself, not merely C as a dependent of the Unix operating system. One of its major concerns, therefore, is C on microcomputers.

I'll keep my eye on *The C Journal* as time goes by because it became a major journal the day its first issue was published. If you're an advanced C programmer and want to keep up, you should subscribe.

The first issue is the kind of miscellany common to fledglings; highlights of the second are reviews of interpreters and "smart" editors. Watch out for typos in the program listings and the articles themselves: they're so predictable in a new publication that usually they're not worth mentioning. And they wouldn't be mentioned now except to C newcomers who might think something was wrong with their skills or tools when a program bombed. Things will get better, I'm sure.

The C Journal is a quarterly; single copies are available. There's a money-back guarantee if you don't like what you get. I like it.

Of printing with C

There you are, bubbling with ideas for The Word Processor That Conquers the World—and you don't mean a low-budget Japanese horror movie either. So you figure on trying to send a text file from your disk to the printer to see how it's done in C.

First, you calmly check the index of your compiler manual (assuming it has one that's any good; some have none and many have one that's not much good). Nope, nothing there. Then you flip through the sections on input/output (I/O). Some things look vaguely relevant, but nothing quite commits to showing you how to send anything to your printer. In fact, nothing comes right out and says you can.

Maybe C can't use the printer? Maybe you bought a compiler package that has no way to use the printer?

Nah! Can't be! So you start looking through the introductory books: first the indexes, then the texts themselves. Hey, there isn't anything on printing in those either! What's going on here?

I don't know what's going on—or, rather, what's not going on that ought to be going on. I do know that nobody explains

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such a basic thing as concerns us now, and that once you understand how to do it, the thing is relatively easy to do.

There are two—just two—points to know.

First, all I/O in C is done through devices treated as files: the console is a file, for example, and so's the printer. Of course, a disk file is a file, too.

In fact, you have to treat the printer the same way you treat a disk file to which you want to write: open it as a file, send to it (as a file) anything you want printed, and—for the sake of good housekeeping—close it as a file when you're finished.

Second, you have to call the printer by its right name. You can't make up its name, the way you would for a disk file. The printer has a limited number of names—sometimes only one—assigned it by the compiler writer. As primitives know, get the name wrong and your target is safe: in this case, you'll just create a disk file. Look at Table 1 for printer device names required by some popular compilers.

Having torn the veil of secrecy, I may as well take you through it with an example. Here is that old chestnut HELLO.C rewritten for the printer instead of the console:

```
/*
**HELLO.C--says hello on the printer
*/
#include <stdio.h>
FILE *walker;
main( )
{
walker = fopen("PRN:","w");
fprintf(walker,"Hello, world!\n");
fclose(walker);
}
```

What we're doing first is declare as a FILE a *pointer* to the constant we'll use for the opened printer. (I've used "walker" to lift our technical editor's spirits just in case he's been having a tiresome day, and to demonstrate that any name will do.) Then, in main( ), we assign the constant to the result of the printer fopen( ) as a file for writing. Notice that I've given the *exact file descriptor* for the printer, including the colon required by some compilers. Now that it's opened, we fprintf( ) to the file—which, of course, is the printer. The last statement, to fclose( ) the printer, may not be necessary in this program because in some compilers a normal exit—one not the result of a program's bombing—closes all opened files. I didn't put it in just to show you how it's done, though. I like to fclose( ) files when I'm done with them because there's a limit to the number that can be open at one time.

After you say "Hello"

Next time, we will begin a mini-series on the "software tools" concept and filter building. We start with a modest little gadget that gets transformed by stages into a powerful WordStar-to-ASCII filter. Don't miss it.

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Manx Software Systems
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201/780-4004

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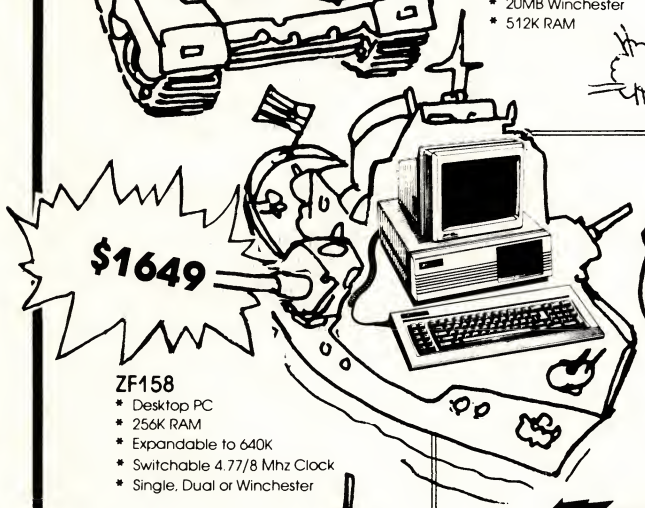

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HERO on Patrol

When he's not being used in class, HERO guards the hallways at Mankato Area Vo-Tech Institute.

David R. Felstul

Wanted: Responsible individual to serve as weekend security guard at local school. Must be willing to work long hours, have great patience, and be cool-headed during emergencies. No pay, but fringe benefits include a battery recharge after each tour of duty. Apply in person, Mankato Area Vocational-Technical Institute (MAVTI), Mankato, Minnesota.

Strange ad? Perhaps, but not any stranger than the two-foot-tall person who applied for the position. Even with his shoulders squared and his single arm fully extended, Heath Company's HERO 1 robot is not exactly an intimidating figure. But who else would work for only an occasional battery charge?

Photo courtesy of the author

HERO 1 comes equipped with an ultrasonic motion detector, a sound detector, a light detector, and his own sonar system—an ultrasonic ranger that can establish the distance to objects up to eight feet away and do so accurately to within half an inch. All of these detection devices make HERO 1 ideal for the role of security guard, according to Dennis Holland, electronics course instructor at MAVTI. "We've had people try to sneak around HERO," he said, "and no one got around him. You can stand as still as you want, and you won't stand still enough that he won't detect some motion."

"However," Holland emphasized, "HERO doesn't replace the security guard; he just aids him." This is an important consideration, since, as Holland explains, many workers are afraid of being replaced by robots.

"It's a lot like the calculator was, coming to replace the slide rule. It was inevitable. And like computers coming into society—everyone thought they were going to lose their job. Well, we've got computers, and we've got higher employment now than we've ever had."

In essence, then, HERO does not replace the human security guards, but he helps them become more efficient by acting as another set of eyes and ears. Right now, Holland is still working out the finer points of using HERO 1. The school has two of them, and Holland plans to make use of both of them as well as a newly acquired HERO Jr.

HERO on patrol

In their current security routine, each HERO 1 patrols one side of a square block formed by intersecting hallways. The HEROs move back and forth at one-half to one hour intervals, scanning down the hallways as they go. The intervals have to be carefully planned so that the HEROs are on opposite corners of the block from each other; otherwise they will detect each other—and not intruders.

Another problem is the HERO's sensitivity. If, for example, their acoustic sensitivity is set at too low a threshold, they will sound the alarm when the building's furnace blowers come on during the weekends.

These problems are easily solved, however. Each robot's sensitivity to light or sound can be adjusted to any one of 256 increments. Also, HERO has to sense both heat and light less than ten seconds apart before he sounds the fire alarm, for instance. Even then, he only calls a human security guard.

Depending on which sensors picked up signs of a possible problem, HERO searches his memory and chooses the appropriate message from among those stored there—such as "I detected light and heat in Building C." HERO then sends this message to the human security guard via a transmitter added to him by Holland and his students.

The guard—who is in another building—comes over and uses a radio-control device to turn off the patrolling HEROs before checking things out. With the addition of appropriate equipment, HERO could call the police or fire department himself. However, they have fielded so many false alarms in the past from less intelligent sensing devices, that many will not accept the installation of direct alarms to the station.

With the intervention of the human security guard, therefore, there's no chance the volunteer fire department in North Mankato will have to tumble out of bed at three in the morning in response to a false alarm.

The remote-control unit is also useful because the school often has groups in it at various times during the weekend;

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the robot patrols can be turned off then. The HEROs are later reactivated by using the same control pad when the group leaves.

The remote-control pad has a 17-key keyboard that lets you talk to HERO just as you would through his own top-mounted keyboard. Programs can be entered using the hexadecimal numbering system (zero through nine followed by A through F). But the guard can also rely on programs already stored in HERO's memory. A simple "A" for auto, "D" for do, along with the memory address of the security program, and the HEROs are again on patrol.

The robots can store many such routines when their memories are upgraded to 56 kilobytes. Of course, each program has to be input into HERO. And with the HERO 1, that can be a bit cumbersome. After all, HERO 1 was designed, in part, to teach hexadecimal programming.

Training HERO

To input a security program into HERO takes the following steps: First, you develop a program which tells HERO how often to wake from his "sleep" mode and scan the area with his sensors. You then decide on the sensitivity of the light and sound detectors and input the desired settings on the keyboard. Next, you input directions for the ultrasonic motion detectors. Finally, you download the program onto HERO's built-in cassette recorder.

You still have to tell HERO where to patrol, however, and the easiest way to do this is to show him with the teaching pendant. With the pendant, you don't have to tell HERO anything in words or numbers. Instead, you simply guide him through the desired motions.

All you have to do is to take HERO out in the hall and use the remote-control pendant in "learn" mode to direct him down the hallway and back. An optical encoder on his front wheel measures the exact distance he travels, and HERO thus can remember the exact sequence of movements. This pattern can also be downloaded to a cassette and any necessary subroutines can be added. (These subroutines may tell HERO to skirt around any obstacles he finds in his path, for instance.) Then these subroutines can all be tied together into one program and HERO is ready to report for duty.

HERO 1 can be considerably more versatile than HERO Jr.

Sound complicated? Well, if so, you can always purchase HERO Jr., which is also made by Heath/Zenith. HERO Jr. is a younger version of HERO 1, and is almost fully pre-programmed. The user just follows the initialization prompts and HERO Jr. is ready to roll—even around obstacles—without any more programming. All his programs are stored in 32 kilobytes of built-in read-only memory (ROM).

Although he lacks the extendable arm, HERO Jr. does come with an infra-red sensor and an optional transmitter, adding to his value as an alarm system. "Since HERO Jr. is pre-programmed, we can just turn him loose and let him roam all over," Holland said, "unlike HERO 1, which requires more work."

HERO 1, of course, isn't limited by pre-programming. He can be considerably more versatile than HERO Jr.—if you're willing to program him.

HERO as teacher

Programming the original HERO 1, though, is not that difficult. In fact, it is his programmability and his built-in 6808 microprocessor that makes HERO so versatile and, thereby, so educational. Throughout our interview, Holland emphasized HERO's educational role. He explained that "the HERO robot is just

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an extension of the Heath/Zenith educational product line. In fact, our use of the robot as a security guard is just a student application of an electronics program. We use HERO in the second year of our two-year electronic-instrumentation and control program."

To emphasize that educational role, Holland has taken HERO on a total of 82 presentations about robotics throughout the state of Minnesota. HERO has appeared on television, at basketball and hockey games, in shopping malls, in newspaper ads, and even at a nursery school.

"Kids love it," Holland said. "They have no inhibitions, and they aren't concerned about the social impact of robots. Besides, HERO interacts; he has a personality. At that nursery school, we had HERO learn to go over, pick up a pop can, and bring it back. Every little boy and girl went through executing the demonstration programs in HERO's ROM using the keyboard on his head. Then each child got to program HERO with the teaching pendant in learn mode." Their instructions were stored in HERO's RAM and then played back to operate him. And they each got a button announcing their success.

It is not hard to earn one of those buttons from Holland. After hearing that Holland's son Shane began doing demos of HERO at age 3, you usually decide that "if a three-year-old can do it, I can" and you eagerly take the remote control from Holland's outstretched hand.

You quickly find out why Holland's electronics students often work through the whole day, even forgetting about lunch. HERO is addictive. You can have the little fellow use his 64-phoneme "vocabulary" to say just about anything, even in French.

It is also very easy to use the remote-control device as a teaching pendant. You can teach HERO to rotate his head, raise his arm, and rotate his wrist at your command. It is just as easy as maneuvering one of those radio-controlled cars for kids, only a lot more fun.

The HERO that Holland has hiding in his electronics laboratory, however, would not roll in a straight line when I tried to get him to do it. I was beginning to think that Holland's three-year-old must be an electronic genius when one of Holland's students saw what was happening and apologized for the robot's erratic path. "Sorry about that. He's just been used so much that his front wheel is out of alignment."

HERO's big brothers

The teaching pendant I was using is an important part of the industrial robotics course, Holland pointed out, because that is exactly how the large industrial robots are programmed. "The robot doesn't know how to weld, how to paint. Instead, the former welder or painter becomes a supervisor and teaches them by using a teach pattern similar to HERO's."

Holland is a firm believer in the future of industrial robotics. "Using industrial robots is the only solution to a lot of our economic woes. It's one way to increase our productivity and quality and catch up to the Japanese." The success of his former students seems to bear this out.

Due in part to the excellent training they receive with the HEROs, the 15 to 25 students per session have no trouble finding employment in robotics, Holland said. "They're trained here and can work in a number of factories around here. And, since we're not just teaching them robotics, but rather applications of electronics, they're often put in charge of automating an entire section of a plant."

"IBM even uses HERO in their in-house training program for developing their large industrial robots," he added. "In fact, one of the IBM qualifications for electronic technicians is to know the HERO robot."

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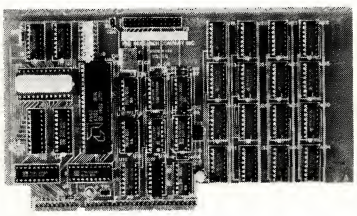

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Palantir: Word Processing for Any Heath/Zenith Computer

Palantir comes in versions for the H8, H/Z89, '100, and '150, whether you're using CP/M or MS-DOS.

Russell Letson

Those of us who own Heath/Zenith computers have a special and enviable problem. If we are inclined, we are able to either add to or upgrade our collections of hardware and operating software. So, we must deal with the inevitable incompatibilities among our various disk and file formats, keyboard layouts, operating-system protocols, and application software.

I, for example, own a Z90 and a Z100, use Z150s at school, and cope with CP/M-80, CP/M-85, the Zenith Disk Operating System (Z-DOS), and two implementations of version 2 of the Microsoft Disk Operating System (MS-DOS).

As an English teacher and part-time writer, I have a special interest in word processing and own several good word processor programs. But if I want a program that allows my files and my work habits to cross hardware and operating system boundaries, the list of packages that are both powerful and adaptable is short: only WordStar, FinalWord, Perfect Writer, PeachText, and Spellbinder come to mind.

Now I have added to that list the Palantir Word Processor.

Palantir is comparable in performance to WordStar, but with a superior command structure and more intuitive operation. It offers on-screen formatting, a command structure that combines menu and keystroke control, justified and proportional printing, merge-print capability for boilerplate and mailing-list applications, larger-than-memory files, file chaining and nesting, and file manipulations from inside the program. In addition, there is the very powerful Palantir Speller, available separately or with the word processor, and the Palantir Filer, a list manager.

Release 1.2 of Palantir for use under CP/M requires 64 kilobytes of memory to run, while 2.0 for MS-DOS requires 128K. Version 2.0 includes utilities for installation on a hard disk and for use with MS-DOS 2 subdirectories.

Unlike the current spate of high-powered programs designed to work their miracles only on machines compatible with the IBM Personal Computer, Palantir is intended to adapt to a number of 8- and 16-bit environments. I first used Palantir 1.1 on my '90 under CP/M-80, then version 1.15 on the '100 under Z-DOS; I am writing this review on release 1.2 under CP/M-85 on the '100, while our English Department computer lab runs Palantir 2.0 under MS-DOS 2.11 on their Z150s. (There is also a version of 2.0 for the Z100 series, completing coverage of the Heath/Zenith family.)

Thus, I can work on any of the Heath/Zenith computers at my disposal (and, of course, on IBM clones and 8" CP/M units). I can move my files among them with the help of file-transfer utilities such as Z-DOS's RDCPM and J. J. Thompson's ZCOPY. And should I need to transport my files to an eight-bit MP/M machine, there is a version of Palantir for that system as well. Since Palantir is written in C, there is no reason that it should not eventually appear in a Unix version, should the market turn that way.

Another attraction for the multi-machine user is the number of terminals and printers supported by the program. Palantir communicates with the outside world through device drivers that the user can change at installation time (for terminals) or on the fly (for printers). The CP/M and MP/M versions, for example, support a dozen terminals, including the H/Z19 and H/Z29, and more than twice that many printers. The MS-DOS versions handle Zenith, IBM, and Columbia color and monochrome monitors.

Most interesting of all for hobbyists and incurable tinkerers, Palantir will sell the assembler source code for the terminal and printer drivers. This allows you to engage in a considerable degree of driver customization. (There's no company support for what you do to them, though.)

Hardware adaptability aside, Palantir's major virtue is its balance between power and usability. Other editors I have tried can do more (frequently things I don't need or will rarely use). However, they require me to struggle with a complex and often counter-intuitive structure.

Palantir does everything I need done and more—*and* lets me think about writing rather than what command to use next. Nor is it difficult to learn; I got a computer novice up and writing in less than an hour—nothing fancy, just typing in and simple editing. Try that with WordStar.

Menus and command structure

Palantir is controlled by a combination of menus and commands. The main menu divides the program into ten functions: Edit, Read, Save, Backup, File, Print, Type, Define, Other, and Help. File, Print, and Define lead to submenus of settings and functions. And there is a Format menu accessible from Edit.

All the menus work the same way: choices may be made by typing the first letter of the selection, or by moving the highlight with the space bar or cursor keys to a selection and hitting RETURN. Inside Edit, two- or three-stroke commands take over the usual matters of format, print attributes, marking and moving blocks of text, and so on.

Palantir's command structure combines a set of fundamental elements to produce a large number of effects. There are three sets of elements: cursor movement and scrolling, print attributes and functions, and what might be called master switches.

Movement through the file is not controlled only by the arrow, home, and tab keys. (Tab moves the cursor a word at a time.) It is also controlled by five dedicat-

Russell Letson is a professor of English at St. Cloud State University in Minnesota; one of his courses covers science fiction.

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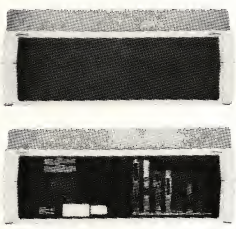

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ed function keys: Line, Screen, Page, Document, and Direction. The last of these, as its name suggests, sets the direction of scrolling, while the first four indicate how much text is scrolled.

Two master switches, Set and Clear (F1 and F2 on the '89 and '100), turn functions and attributes on and off; thus Set Line inserts an empty line, while Clear Line deletes a line. All transient print attributes—such as underlining, superscripting, and boldfacing—are toggled by Set-Clear pairs.

A third master switch is the Find key. Its most obvious use is in search and replace operations, where it is the "argument" of Set. By itself, however, it locates the next occurrence of any character in either direction; thus Find plus a period amounts to a tab-by-sentence function. Find also works with Line and Page to move the cursor to a specific location; with Home, it works to move to a spot previously established by Set Home.

Impermissible Sets, Clears, and Finds result in a beep and a message such as SET IGNORED (or CLEAR IGNORED or FIND IGNORED). The Cancel key provides a general escape hatch so that errant keystrokes or injudicious block deletes can be called back before the RETURN key puts them into effect; there is, though, no Undo or Oops function for recalling deleted text.

Palantir makes good use of the various Heath/Zenith function keys. For example, the keypad and all eight of the function keys on the '90 are enabled. So single keystrokes handle cursor movement, scrolling, and paragraph reformatting. Other basic functions need only two keystrokes. For example, Set B turns on boldface; Set D displays the "hidden codes" that govern formatting and print attributes; Set P makes page breaks from the cursor position.

There are about forty of these Set commands to control hard spaces (line break not allowed), hard page breaks, hard and soft hyphens, indenting, centering, right-flush format, overstriking, decimal tabs (lining up columns of numbers on the decimal point), single and double underlines, headings and footings, and so on.

Text entry and editing

The main menu always appears with Edit highlighted, requiring only a RETURN to enter that portion of the program where all text creation and changing takes place. The first line of the Edit screen holds status information—direction of cursor movement; page, line, and column numbers; Insert/Change mode; and Sets and Clears as they are invoked. (It would be nice if the current line-spacing setting were displayed here, too, but it's buried in the Format menu.)

Next on the Edit screen is the format ruler, a reverse-video bar marking tabs and margins and bearing an N, J, S, or M for Normal, Justified, Semi-justified, or Manual format.

(Semi-justified is pretty much what it sounds like: a ragged but not-too-much ragged right margin; the manual says it works by "spreading half as many spaces over the line as justifying." Manual is a "literal" mode useful for editing source code; it puts carriage returns only where you type them in.)

Prompts and messages for various functions appear at the bottom of the screen.

Entering text is simply a matter of typing on the screen. Cursor, backspace, and delete keys operate as you would expect. As you enter new text, wordwrap keeps you within the margins. And the RETURN key ends paragraphs.

Palantir is a *what you see is what you get* editor, with some exceptions: double and triple spacing do not appear on screen, nor does justification. Print attributes such as boldface and underline show as reverse or high-intensity video, special colors, or themselves, depending on the terminal driver. Boldface and underlining appear as themselves on the H/Z29 screen, as reverse video on the '90 and monochrome '100, and as red and blue letters respectively on the color '150. (I've not had a chance to run Palantir on a color '100, but I believe the screen attributes are the same as on the color '150.)

All text entry and editing and most formatting are done on the Edit screen; only setting tabs, margins, print format, spacing, and a few other matters require the nested options of the Format menu. It is possible to create and edit documents up to 250 columns wide; when it is necessary to move beyond the eightieth column, the screen scrolls horizontally in 16-space increments.

Complex editing tasks are quite straightforward thanks to "range finding," the mark-and-activate logic that governs all of Palantir's block operations. To delete, move, or copy a block of text, you first mark it with a Set command—B for Block, N for Named Block (described below), or D for Delete. Then, in response to the prompt, you move the cursor in order to highlight text in either direction by character, word, line, screen, page, or even the whole document.

In fact, you can go to the next occurrence of any character or text attribute, such as a period, a comma, or a Set Underline. This allows the quick highlighting of sentences, phrases, paragraphs, or any blocks that you can unambiguously identify. If you overshoot, text may be deselected by backing up with the opposing keys or by reversing Direction. Cancel will abort the operation at any stage before the RETURN that completes range finding and passes control to the designated function.

Besides moving blocks of text around within a document, you can also create a Named Block. This is a chunk of text that you give a name so that it can be stored on disk. This operation is invoked by a Set NB command. It works exactly like a regular block operation until the end of the operation. Then a prompt at the top right of the screen asks for a file name.

It's possible to retrieve and insert a Named Block with the Set NM (Named Move) command. This works the same as a regular block move except for, again, the prompt asking for a name. It is possible to call Named Blocks into a file with the INCLUDE command, which is part of the Mailout machinery. A file can consist entirely of INCLUDEs—which is one way of bringing a set of chapters together for printing, or of assembling boilerplate text into a mix-and-match document.

Palantir's Find operations deserve spe-

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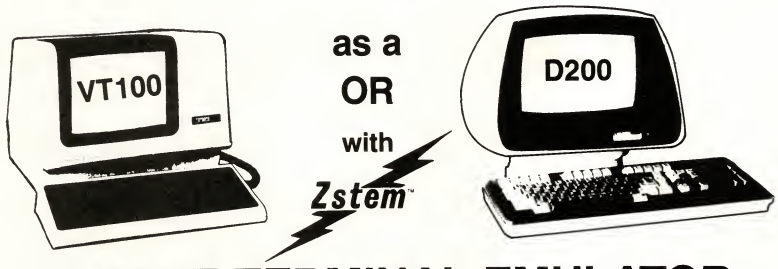

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cial attention because of the degree of control they allow. As with most word processors, Palantir can find the next occurrence of an item for a single search and replace or search and delete, and it can go through the entire file for a global search and replace or delete. Find is bidirectional, and during search and replace operations it can be either manual or automatic.

As with most word processors, Find can be literal, showing instances of the exact character string you asked for. But Palantir's Find can also take wildcards as part of the specification. So you can look for "w?rd" and get "wird" and "wyrd" as well as "word."

The program also lets you switch from its default "noisy" mode, with finds and changes echoed on the screen, to "quiet," with only the number of finds displayed at the bottom of the screen at the end of the search. The program automatically reformats and rewrites the screen at each replacement in noisy mode. So, the quiet option can save considerable time when working on a long document—40 to 50 percent, according to the manual.

Canned formats

One purpose of a word processor (as opposed to a simple text editor) should be to automate the mechanical and repetitive aspects of writing and producing documents. Palantir makes it possible to set up formats for as many kinds of documents as you like.

Palantir stores format information in a header at the start of each .WP file. When a file is read into the text buffer, the editor looks at that information and arranges the screen settings accordingly. Each time the program starts up, it looks for a file named DEFAULT.WP and sets spacing, margins, tabs, and such from it.

The DEFAULT.WP file is no more than formatting information and a single carriage return, although custom format files can contain whatever text you want to include. The company supplies a DEFAULT file on the distribution disk to set up a fairly standard double-spaced typescript page, but you can modify it or make up your own using the Define and Format menus.

There may be only one DEFAULT.WP file on the program disk, but I have created alternates, for example a LETTER.WP file for correspondence (single-spaced, my return address already in place).

Foreign files and portability

The same header that makes formatting so easy also makes it necessary to take some care when using Palantir to edit files not created by it. The program produces and reads ASCII files, but it does need to "naturalize" some kinds of foreign input. Palantir operates within CP/M and MS-DOS file conventions and reads a file's extension (file type) to determine how to treat it.

The .WP and .WPB extensions indicate files with Palantir headers (and therefore formatting information); for other extensions, Palantir sets page length to zero and the Edit screen to Manual mode (no wordwrap or soft line breaks). This allows for the editing of program files or the conversion to Palantir format of output files from spreadsheets, data base managers, or other editors.

This procedure is not always trouble-free, however. When I first tried to run my Magic Wand files through Palantir, I got a gaudy mix of normal and reverse-video text. And it would not format when I followed the manual's instructions to Set Format to Normal and reformat the entire document.

It appears that Palantir, despite its own very long (250-character) lines, will not accept the paragraph-long "lines" that make up a Magic Wand file. I finally figured out the nature of the problem and a way to get around it. However, users—even Heath hobbyists—should not have to fiddle with such stuff.

Fortunately, the company now offers translation programs to make WordStar and Magic Wand/PeachText digestible, and they are working on filters for other programs.

Palantir's major virtue is its balance between power and usability.

On the other hand, the ASCII files generated by, say, a data base manager or a spreadsheet present no problems. I have been able to read, format, and edit output (that is, text) files from SuperCalc and dBASE II, and the manual includes instructions for preparing and including Multiplan tables.

A more serious problem is presented by Palantir's tendency to choke on text files downloaded from a bulletin board. In some cases, the program has locked up or unceremoniously exited to the operating system on encountering characters it did not expect—or not finding what it did expect.

A call to the technical-support number yielded the explanation that Palantir wants a file to end with a carriage-return, line-feed, control-Z sequence. My call, however, yielded no easy fix inside of Palantir. Apparently, the only way to cope with this one is to run downloaded files through another editor. (I have used Magic Wand, but ED or EDLIN will do.) Delete everything after the last line of text, and do a save.

With the help of utilities such as ZCOPY.COM from J. J. Thompson and RDCPM.COM, I have encountered no trouble at all in transporting my files from one Palantir environment to another. Last year I moved most of my files from the '90 to the '100. Later, I wrote an early draft of this review using Palantir 1.15 on the '100. Last week, I ran a disk of class handouts, written on Palantir 1.2 on the '100, through RDCPM and took them up to campus for more work on 2.0 on a '150.

Through all of this, the only parts of the user interface that changed were function-key assignments and a couple of video attributes on the monitors. Even changing printers was no problem; so long as the drivers matched the hardware, the only thing that I saw change was the typeface on the hard copy.

Some users have commented on a problem when scrolling with Palantir on the '100 under MS-DOS version 2. Apparently, when you move from page to page, scrolling jumps a line at a time. The resulting display can be quite annoying. (See "The Search for the Ultimate Word Processor," by Kenneth W. Daniel, *Sextant* #18, September-October 1985.)

This problem seems to result from an interaction between Palantir and MS-DOS 2. Under Z-DOS, Palantir 2.0 is about as fast as 1.2 under CP/M. It takes about three seconds to fill the screen on a screen-at-a-time scroll. This is a bit slower than the same operation on a '150. (But the '150 version uses memory-mapped video, while CP/M is communicating to an "external" terminal.)

Saving and printing

The ever-useful Cancel key takes you from the Edit screen back to the main menu and its choices. While it is not necessary to save a file before printing, it's a good idea. An "S" for Save brings up a prompt asking for a file name (for a new file) or whether the current name is acceptable (for an old file).

Since a Save empties the text buffer, you may prefer Backup. This also writes the entire text to disk (again, with a naming prompt for new files), but then reads it back for printing or further editing.

Should the disk fill up before the whole file is saved, Palantir will stop the operation and give a "disk full" warning. This is a good time to use the File menu, which allows you (among other things) to log in a new data disk or to examine the directory of any logged disk and delete or transfer files to make space. Palantir automatically makes the old version of a file the backup (.WPB extension); so, clearing space is generally a matter of erasing the backup of the current file.

You may want to check some of the format values before printing. The Define menu lets you set or change top and bottom margins, offset, and other settings that affect the whole document. (This is unlike the Format menu, whose settings can be changed at any time inside the document.) Printing itself is simple: check or change settings a last time on

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the Print menu (you may elect to print only a range of pages), hit RETURN, and let the program do its work. The process can be paused or aborted at any time with the Cancel key. Or you can repeat it as many times as desired, manually or by specifying the number of copies.

Palantir allows considerable flexibility in printing. For instance, you may change printers at print time. (This is handy if you use both dot-matrix and letter-quality machines.) You can shift ribbon color or switch between proportional and fixed spacing. You can change to a special typeface at any time within a document. (The Epson FX driver, for example, supports italics, emphasized, and double-wide characters.) You can also send special codes directly to your printer (via Type on the main menu).

Given those options and the number of printers the program supports, it's hard to imagine a hardcopy effect that can't be managed. Another attraction for the owner of an Epson with Graftrax is the separately available Epson Support Disk, which, says the manual, "includes the EPSONMXG.ASM printer driver source listing and the printer customization notes."

Mailout

One of Palantir's strongest appeals for business users will be Mailout. This, like WordStar's MailMerge, consists of a set of functions controlled by commands placed in regular text or in a file by themselves.

The simplest command is probably Include, which allows files to be chained and nested to produce boilerplate or to print a long text from a number of shorter files. Other commands allow the insertion of variables, such as names and addresses, fetched from a data file or typed in at print time, for the production of form letters. Add to this conditional commands (not available in WordStar), and you have some interesting possibilities.

Palantir will not only insert variables, it will also do so selectively in response to an If command which permits the program to Skip, Get, or Print a variable or Include a piece of text. The content as well as the name and address of a boilerplate form letter now can be customized on the basis of any item in a data file—name, city, ZIP code, balance due, or hair color.

Palantir will also do arithmetic (integer in CP/M, decimal in MS-DOS) and act on the result. So it is possible to, say, figure half of each balance due and request a different dollar figure in each letter.

This is a miniature progamming language, complete with "and," "or," and "not" logical operators. While it lacks the full power of, say, dBASE II, it makes Palantir quite a smart and flexible word processor.

Such power implies a need for some of the same precautions as a programming language. And Palantir lets you leave notes in your files to serve as reminders or comments on format, content, command sequences, and so on. Such notes can appear not only on the Edit screen, but on the Print screen as well; there, they can pause the printing process and present comments and current variable values.

Mailout will accept data from standard BASIC files, dBASE II, the TIM data base manager, or files prepared using Palantir itself; the manual's Appendix includes instructions on using data base files with Mailout. The Palantir Filer, which I have not seen yet, is designed to operate with this part of the word processor.

Unfortunately, Palantir does not support macros—that is, sequences of command keystrokes that can be stored on disk or in memory and played back for execution. It *is* possible to have command files, but that is restricted to the Mailout commands (INCLUDE, READ, and so on).

I've never felt the need for macros with this program; although I've never had to do things like document conversion that a friend (who works in a documentation shop) has to put up with. I don't have any external macro utilities, such as ProKey; so I don't know how Palantir would interact with one. I don't see why it wouldn't work, though—Palantir is a very well behaved program from the operating-system point of view.

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The Other function and others

The File menu allows access to operating-system file handling. Nonetheless, you may want to do more complicated jobs and still return to editing a document; this is the purpose of the Other choice on the main menu.

Other invokes a menu that works just like the other Palantir menus—except that you can temporarily exit to the operating system or choose from as many as nine programs. The programs are your choice. They could be spellers, spreadsheets, or data base managers: anything that you have specified during installation—including Palantir itself.

When you choose a program under Other, Palantir saves your current file and later returns to the spot from which you exited it to the main menu. Only programs, not system commands, are available through Other. (The manual says to use the File menu for directories, copying, and such.) You may find some utilities which will not work. Both of my sorted-directory programs, for example, will hang the system if called from Other. Since the text file has been saved, however, this is an irritation rather than a disaster.

Another convenience is the Lexicon key. A Lexicon file containing up to thirty-six user-defined phrases of up to 250 characters each is loaded into memory at the start of each session. Each phrase has its own single-character code (preferably mnemonic); when typed after the Lexicon key, the code inserts the phrase into the text at the cursor position.

A "phrase" of 250 characters equals more than three lines on an 80-column screen; so Lexicon's 36 entries can contain a significant amount of boilerplate. If you need to import larger pieces of text or want to include fancy formatting or print attributes not permitted in Lexicon entries, the Set Named Move command will serve.

Documentation

A new User's Guide now accompanies Palantir. It's a slipcased binder with chapter dividers, a detailed table of contents and index, and lessons. The manual does not assume computer sophistication; it covers everything from installation on, and includes separate comments to explain general ideas such as virtual files or the type-ahead buffer.

The lessons, keyed to sample files on the distribution disk, take a new user from elementary text entry and editing through form letters and use of Mailout commands. An appendix for each operating system deals with terminal- and printer-driver characteristics, file compatibility, prompts and messages, and Mailout examples.

The whole manual is cleanly laid out and easy to use. In addition, the main menu's Help option calls up many screens of information that cover all fundamental operations. (You can customize these Help screens by editing them with Palantir.)

And should you become terminally befuddled, Palantir offers 90 days of free phone service by way of an 800 number. Their ads say that they will not just send you back to your dealer but will solve your problem or buy you another word processor of your choice. I have not needed to test that last promise, but I have found the staff friendly and helpful when I called with questions—and frank about things the program cannot do.

Conclusion

Palantir has features that I have not been able to treat in a short review—the hyphenation "hot zone" (similar to WordStar's), some details of Mailout, and most of those 40 Set commands. There are also features that it lacks: multicolumn format, footnote or index generation, fully automatic reformatting, background printing, creating a disk file able to control printer features, reassignable function keys, and windows.

Some of those lacks will become insignificant with the availability of such operating environments as Digital Research's Concurrent DOS or Microsoft's Windows; others are on Palantir Software's list of desirables for future releases.

On the whole, Palantir offers a remarkable combination of power and elegance; there are very few word processors that can compete with it for flexibility, speed, ease of use, and error-handling. And nothing I have seen carries those qualities to so many different machines and operating systems.

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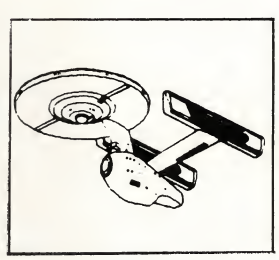

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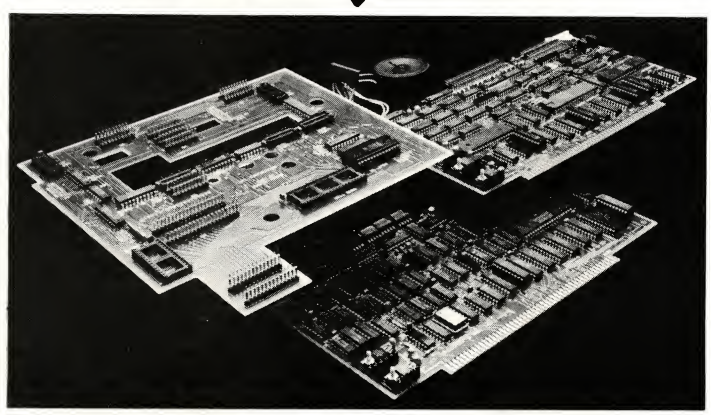

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Z100 Notebook

Alison Phillips

Greetings computer enthusiasts and friends. It is good to meet again in this sixth column in the "Z100 Notebook" series. I have enjoyed every minute of it and appreciate the kind responses I have received. Once again, I will cover a variety of topics.

Hang on—here we go!

PeachText and hierarchical directories

I capitulate. I am through with hierarchical directories on 5¼" disks, at least until I start using software that supports hierarchical directories.

Originally, I thought it was a great idea to set up my 5¼" PeachText data disks with hierarchical directories; then I could enjoy separate directories for my letters, articles, documents, and the like. Now, I am dissatisfied with this arrangement.

I like to maintain all of my executable (binary) programs on an 8" bootable disk with a separate directory for each family of programs; this saves the frequent changing of program disks.

The arrangement with the 8" disks works well, but trouble develops when attempting to access the data files from different directories on the 5¼" drives. PeachText doesn't recognize MS-DOS path commands; so, if I am editing a document which was loaded from the DOC directory and wish to have PeachText include a file from the ART directory, it just can't be done. In effect, PeachText's INCLUDE command is negated.

In addition, hierarchical directories impose another inconvenience. If I have finished an editing session while working from one directory, and wish to edit a second document which is in another directory, I must exit the Edit program, exit PeachText, and change directories from the MS-DOS command line. Then it is necessary to reload PeachText, reload Edit, and load the second file in order to continue the editing session. How clumsy can a word processor be?

To avoid this recurring hassle, I have taken two actions. First, I have made a separate disk for each principal type of data file that I frequently use, such as letters, articles, and documents. This provides the orderliness I like. And it is certainly easier to change a disk than fight PeachText into loading files from a hierarchical directory.

Second, I use a miscellaneous data disk where I place all my "odds and ends" data files in the root directory. Then I carefully select file name extensions so that like files can be viewed using the DIR command's wildcard capabilities.

For example, I can type from the MS-DOS command line

```
DIR *.TXT
```

and get a nice clean directory of the text files on the disk. With all of the files in the root directory, PeachText has no trouble locating any data file on the disk. (For more on organizing files by extension, you might want to look at John Walker's "File Naming Conventions" in the "Standard Operating Procedure" of *Sextant* #13, November-December 1984.)

ZCLK clock/calendar

An associate of mine first learned of the ZCLK clock/calendar by reading the announcement that appeared in *Buss* newsletter's issue #96. ZCLK is a plug-in circuit board from FBE Research Company of Seattle, Washington. ZCLK provides the Z100 with an on-line time and date capability. Its list price is $89.95 postpaid, and it's available only through Heath/Zenith.

ZCLK sets the time and date upon bootup by means of an AUTOEXEC.BAT file. ZCLK has a lithium battery which keeps the clock running during power-off periods. The battery has a life expectancy of about two years.

My friend ordered his ZCLK when it was available directly from FBE Research. Delivery was made within ten days. We installed ZCLK in his Z100 and shared in its evaluation.

The ZCLK package consists of a fully assembled circuit board, a disk containing programs for setting the clock (together with source code), and complete documentation in an attractive and sturdy folder. (An excellent article on ZCLK appears in the February 1985 issue of *REMark*. See "ZCLK: A Calendar/Clock Module for the Z-100," by Larry T. Weir.)

The board is rectangular, about 2" x 4" in size, and has screen-printed legends. All of its integrated-circuit (IC) chips are socketed. (That is to say that sockets are soldered to the printed-circuit board so that the ICs can be easily removed or plugged in.)

The board contains a 32.768-kilohertz crystal oscillator, and three ICs.

The ZCLK circuit board installs on the motherboard of the Z100. In the case of the low-profile unit, there is not even a video circuit board to remove. No expansion slots are used, no soldering or wiring is required, and ZCLK removes as easily

as it is installed.

ZCLK shares signals with chip U114, the Z100's 68A21 Peripheral Interface Adaptor. This is removed from the motherboard and then plugged into the ZCLK circuit board. The ZCLK board in turn plugs into the U114 socket. ZCLK uses the OKI Semiconductor MSM5832 real-time clock and calendar IC.

The program ZCLK.COM is furnished on the ZCLK distribution disk. For automatic date/time setting, it is necessary to execute a Z-DOS or MS-DOS AUTOEXEC.BAT file upon bootup. You can use an editor to add ZCLK as a command line within the AUTOEXEC.BAT file. Also, the ZCLK.COM program should appear on any Z-DOS or MS-DOS system disk that contains the AUTOEXEC.BAT file. Software provisions are provided for making the semi-annual daylight savings time adjustments.

ZCLK may be installed with the CP/M-86 operating system and works well with CP/M-86's TOD (time of day) utility. FBE Research also provides (at $5 additional cost) a version of ZCLK.COM which may be used with CP/M-85.

Operation of ZCLK is not affected by the clock speed of the Z100's central processor unit (CPU); if the computer functions properly at 7.37 MHz or 8 MHz, then so will ZCLK. My associate's ZCLK has been in operation for several weeks with the Del Scientific 7.37-MHz Turbo Z100 High Speed Clock Unit, and no adverse effects have been noted.

Further, FBE Research states that ZCLK does not interfere with modifications which replace the 8088 CPU, such as D.E.L. Professional Systems' 2+2 8087 co-processor accessory board.

At the time of this writing, there are at least three local owners of ZCLK who have been troubled with the loss of time following power-off periods. These problems were eventually resolved.

If you are experiencing trouble with ZCLK, be sure to read about the "Fix for ZCLK's Dropping of Time and Date" in *Buss* #108. FBE Research is standing behind this product.

Piping and redirection

Piping, as used with the MS-DOS operating system, comes from the root term "to pipe." (It is not to be confused with PIPping, which refers to CP/M's copy command. PIP is an acronym derived from "Peripheral Interchange Program.")

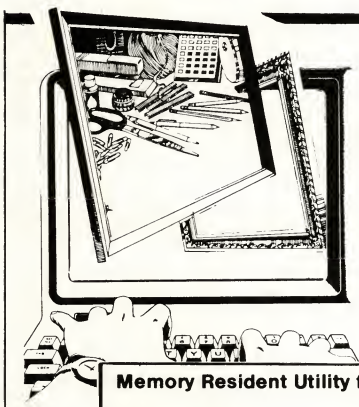
Included among MS-DOS's features is the ability to take the output of one program and "pipe" it: use it as the input to another program. MS-DOS's SORT, FIND, and MORE utilities make good use of the pipe feature. The pipe command always contains the pipe character, the vertical bar (|): for example, DIR | MORE. (The | is sometimes called a *stile*.)

Unlike piping, the redirection feature of MS-DOS takes the output of a program, not from one *program* to another, but simply from one *device* or *file* to another.

The redirection characters are > and <. Each character points in the direction of the data flow. Table 1 shows a few examples of commands using redirection

```
(1) DIR A: > TEST.ERA
(2) DIR B:>> TEST.ERA
(3) DIR C: > PRN
(4) DIR B: | SORT > PRN
(5) DIR A: | SORT/+9
(6) DIR C: | SORT | MORE
(7) SORT < OLD.FIL > NEW.FIL
```

Table 1. Some examples of commands using the redirection and piping characters. > indicates redirection; >> indicates concatenation; and | indicates piping.



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and piping characters.

Examples (1) and (2) redirect the output of the directory program into a file named TEST.ERA (ERA for erase). The double redirection symbols > > are used to concatenate the directory listing to the end of the file named TEST.ERA. The TEST.ERA file may be either TYPEd or SORTed.

Examples (3) and (4) redirect the output of the directory program to the printer.

MS-DOS's SORT utility provides a switch which allows the user to define the start of the sort field. Example (5) demonstrates how the /+9 switch is used to sort the directory listing by the file extension. The file extension starts with the ninth character in the file name. The sorted output will go to the screen by default.

Example (6) shows how piping commands may be cascaded. The directory listing is first sorted and then passed to the MORE utility for paging.

Finally, example (7) shows how to sort an old ASCII file and place it in a new file. The SORT program sorts the text file alphanumerically, by lines. (For SORT to work properly, each item to be sorted must be separated from the next item by a carriage return.)

Printer throughput

Printer manufacturers have a way of citing the best specifications of their printers, sometimes without qualification. They will say that a given dot-matrix printer prints at 100 or 160 characters per second. Or perhaps, if it is a daisywheel printer, they will give the speed as 15, 20, or even 40 c.p.s.

I have found that the practical printing speeds of printers differ significantly from the published values. This has proven to be the case for printers such as the MX-80, the MPI 99G, and the DTC 380Z.

The specifications for the Diablo 630, though, have proven more dependable. They call for a print speed of "up to 40 c.p.s. with a plastic print wheel." The specifications also call for a minimum print speed of 32 c.p.s. with a standard metallized print wheel.

I used a test document, similar to the text you are reading, which contained 31,220 characters (5,386 words). It required 14.23 minutes to print the document double spaced at a pitch of 12 characters per inch.

Those figures work out to approximately 36.5 c.p.s. This value is well within the stated specification, and shows that from a practical view, Diablo delivers as advertised. Many printers do not; it is best to test a printer before you buy it.

An additional Diablo nicety is that the tractor feed maintains near perfect paper control, forward or backward. Page registration is maintained, so that the top and bottom margins remain the same on the last page as they were on the first. I have found that the page register frequently slips on printers that depend entirely on friction feed when printing long documents.

Chattering and growling disk drives

Have you noticed, particularly with MS-DOS, an unusual amount of disk complaining? It could be hardware related, or software related, or the way the files are placed on the disk.

As you may recall, Z-DOS's CONFIGUR utility does not allow us to set the rate at which the disk drive steps between tracks. If the step rate for 8" drives is longer than 3 milliseconds, the drives may not perform as smoothly as they should. If the step rate for 5¼" drives is greater than 6 ms, they too may be noisy.

The CONFIGUR program of MS-DOS version 2 displays the current step rate for both the 8" and the 5¼" drives and allows the user to change the step rate—just type CONFIGUR and follow the menu prompts.

Another cause for poor disk drive performance occurs when files become fragmented; see the section which follows.

Using TREECOPY to renew a disk with hierarchical directories

If there has been heavy disk traffic for a long time, and if many files have been added and deleted, individual files will

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be scattered in different pieces all over the disk, rather than being stored in contiguous areas. This will be reflected in the file-allocation table (FAT), which keeps track of the disk locations where files are stored; it will show a number of non-contiguous clusters within a given file. (Clusters for 360-kilobyte disks consist of two 512-byte sectors.)

When you copy a long file to a newly formatted disk, the file is written to consecutive tracks starting with the peripheral tracks and working toward the center of the disk. It is efficient to read a file which is written in contiguous sectors on contiguous tracks; there is less head movement in the disk drive, and head movement and settling time slow down disk accesses.

When a number of files are erased and others are written, MS-DOS reuses the disk space given up by the erased files as efficiently as it can. The result is that a file written at a later time may occupy tracks here and there all over the disk; access time is slowed and you can hear the read/write head jumping from track to track.

The time has come to renew the disk.

Renewing a disk which has many hierarchical directories can be a chore—unless you do it right. One might simply use MS-DOS's DISKCOPY utility or Z-DOS's DSKCOPY program, as the case may be. Both of these programs first format the destination disk and then copy the source disk, track-by-track, to the destination disk. The destination disk becomes an exact replica of the source disk—warts and all. This is not to be desired.

A second procedure, which produces a "cleaned up" disk with contiguous sectors in all files, starts with a newly formatted disk in the destination drive. This procedure requires that each directory that appears on the source disk be made on the destination disk. The MS-DOS MD (make directory) command is used for this purpose.

Making a series of directories, however, requires that the user type MD <directory name> for each directory. After all of the directories have been made on the new disk, the user must use wildcard (*.*) specifications to copy the contents of each directory on the source disk to the corresponding directory on the destination disk.

This second procedure restores the contiguity of the files, but it is so tedious that it discourages the idea of renewing old disks. That tedium can be relieved by using MS-DOS's APPLY utility, which allows you to execute a specified command a number of times. APPLY, though, takes a certain amount of learning. What if you have not yet mastered its power?

TREECOPY comes to the rescue.

TREECOPY is one of the useful utilities which make up the MS-DOS environment. It is furnished on a distribution disk in the Programmers' Utility Pack.

Unfortunately, Zenith let us down with the documentation for TREECOPY. Not a single example is given to show the command syntax, and the explanation for using TREECOPY is both vague and seemingly contradictory.

Here is a quote which leaves me puzzled and has caused head-shaking among my associates: "*Note:* TREECOPY cannot copy files or directories across disk volumes...."

Contrary to what the above quote may imply, TREECOPY will copy all of the directories and associated files from the source disk to the destination disk—if you can find the right command to execute.

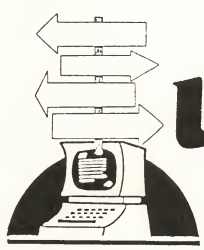
TREECOPY copies each file individually, and since the destination disk is newly formatted, there are no non-contiguous sectors in the destination files.

Listed below is the command I used to copy all directories and files from drive C: to drive D:

```
TREECOPY C:| D:|
```

Wouldn't it have been nice if the Programmer's Manual had given us this example?

Before the command is issued, use the CD\ command to change the current directories in both drives to the root directory. You may also use the CHKDSK



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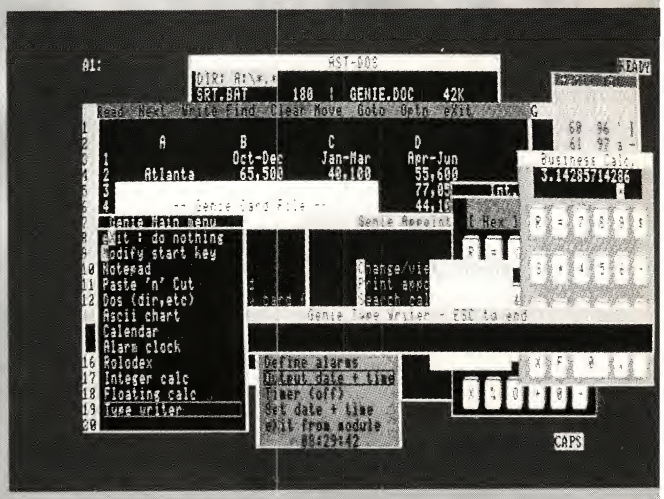

Shown here is Genie "popped up" on a Z-110 running Lotus 123. From the left are: The Genie main menu, the Genie rolodex style card file, the Genie notepad containing data cut from Lotus, the Genie DOS performing a directory command, the Genie alarm clock (at the bottom,) the Genie typewriter, Genie calendar, Genie Cut and paste, Genie Calculators, and the Genie Ascii table.

Genie is a memory resident application. This means that once you load Genie it is always available for you to use. Just hit the magic keys and Genie will appear (Shift-Shift: No function keys lost.) You can have Genie perform various tasks, and when you finish Genie goes away and you are back where you started.

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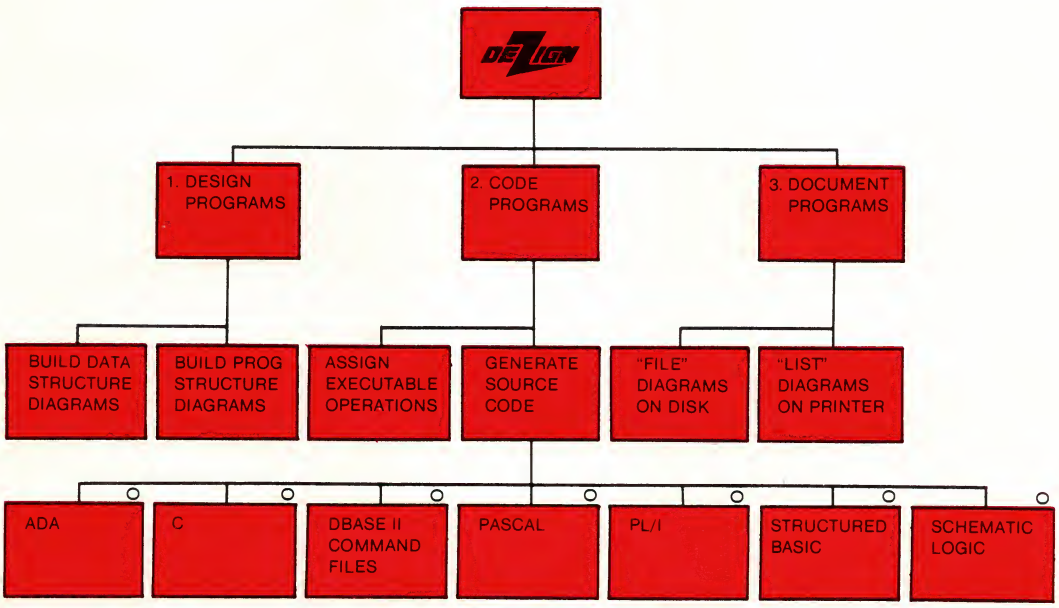

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<filespec>/V command to ascertain whether a given file has non-contiguous clusters. With the verbose (/V) switch set, MS-DOS version 2's CHKDSK will inform you if files are contiguous or specify those that have non-contiguous clusters.

Using MS-DOS's IF command

Version 2 of the MS-DOS operating system has a powerful set of 27 resident commands. Resident commands are an intrinsic part of COMMAND.COM, the operating system's command processor. COMMAND.COM is loaded into main memory when the system is booted, and remains there to intercept all MS-DOS commands. It serves as the interface between the user and the computer.

Now that I have used and enjoyed these 27 resident commands, I feel abused when I have to return to CP/M and be limited by its meager six resident commands.

But using all of the MS-DOS resident commands has its price—you have to hunker down and learn them.

There are eight resident commands used primarily with *batch* files. These batch commands are: PAUSE, REM, IF, SHIFT, SET, FOR, ECHO, and GOTO. Taken as a whole, the batch commands form a rudimentary programming language which gives considerable power to batch processing.

Batch files are created with an editor and usually consist of a series, or batch, of operating-system commands interspersed with commands to call disk-resident programs ("transient" commands). Batch files are named in the general form of FILENAME.BAT, where FILENAME is a name of your selection and the file extension .BAT is mandatory.

Only one command is allowed on each line of a batch file. To execute a batch file from the command prompt, enter the batch file name and follow it with a RETURN. It is not necessary to enter the extension.

The IF command is one of the eight batch commands. Its purpose is to allow conditional execution of MS-DOS commands within a batch file. It takes the general form of "IF <condition> <command>" or "IF NOT <condition> <command>". The word "condition" is limited to one of the following three conditions:

(1) IF ERRORLEVEL number.

A better name for ERRORLEVEL would have been "exit code." ERRORLEVEL is a number (exit code) which MS-DOS returns when a program is exited. An exit code of 0000 means that the program ran with no interruption. An exit code greater than 0000 means that some sort of problem was encountered. Most MS-DOS programs return an exit code of 0000 at all times.

(To find the value of an exit code, you may execute the MS-DOS command XYZZY ON; then run a program which exits back to the command prompt. Most MS-DOS programs will return a message which reads: "Exit code of child process is 0000".)

(2) IF <string1>==<string2>.

This tests the strings and will be true IF, and only IF, string1 and string2 are identical. String1 is the string that is given in the batch file, and string2 is the string returned by the program.

(3) IF EXIST condition.

This checks to see if a file exists on the designated disk. If it does exist, the condition is true—which causes the command in the IF statement to be executed. Otherwise, the batch program will "fall through" to the next command in the file below the IF statement.

An example will follow shortly showing how the general form of "IF NOT <condition> <command>" is translated to the useful form of "IF NOT EXIST GOTO NEXT". I'll now set the stage for a batch program which uses the IF NOT statement.

Assume that you have 150 MS-DOS disks. Some of these disks contain the IO.SYS file, say, and others do not. The disk labels unfortunately do not distinguish between the two. Further assume that, to speed up data flow to the printer, you have just patched the IO.SYS file on a master disk. (Such a patch to IO.SYS is described in the December 1984 *REMark*. See "Some Fixes for MS-DOS 2.13," by Pat Swayne.)

Now all of the 150 disks must be checked, and those having an IO.SYS file must be updated with the newly patched version of the IO.SYS. Remember that the IO.SYS file is hidden; it doesn't appear in the directory, and normally cannot be erased. This is the type of situation which calls for a batch file.

Select your favorite editor and create a batch file named FLG.BAT. The listing of FLG.BAT is shown in Listing 1.

```
:TOP
FLAGS B:IO.SYS
IF NOT EXIST B:IO.SYS GOTO NEXT
ERASE B:IO.SYS
COPY IO.SYS B:
FLAGS B:IO.SYS RHS
:NEXT
.Place another disk in drive B, else type CTRL-C
.If disk contains IO.SYS, it will be replaced with
.newly patched IO.SYS.
PAUSE
GOTO TOP
```

Listing 1. FLG.BAT will check a disk in the B: drive for the presence of the IO.SYS file. If it is there, it will have its read-only, hidden, and system flags removed, and be replaced by a new IO.SYS file. Then the flags will be restored and you will be prompted to put a new disk in the drive in order to repeat the process.

Some preparation must take place prior to using the FLG.BAT file.

Place the disk containing the newly patched IO.SYS file in drive A:. We will call it the source disk. Boot the system from the source disk, and copy FLG.BAT to the root directory. Also copy to the root directory the FLAGS.COM utility. (ATTRIB.COM may be substituted for FLAGS.COM. Both programs, ATTRIB and FLAGS, perform the same function, which is to set the attributes, or flags, of specified files. See the following section for details.)

From the MS-DOS command prompt, type FLG, and the execution of all of the commands contained in FLG.BAT will begin. The batch file, as written, loops perpetually; you must type CTRL-C to exit after all of the disks have been checked.

In response to the successive prompts, place each disk to be checked in drive B:. If the selected disk has no IO.SYS file, then the IF statement causes a jump (GOTO) to the label :NEXT.

If the disk placed in drive B: contains IO.SYS, then IO.SYS is erased and the new IO.SYS is copied in its place.

This FLG.BAT file shows the IF NOT statement in use, but an understanding of what happens hinges on the word EXIST.

EXIST <filespec> is a condition which will be true if, and only if, the specified file exists on the designated drive. Also, the statement as a whole can only be executed if the command which concludes the IF statement is a valid MS-DOS command.

If we convert the "IF NOT EXIST B:IO.SYS GOTO NEXT" statement to plain English, it says: "If the file, B:IO.SYS, does not exist on the disk in drive B:, then GOTO the label :NEXT". The three lines that follow :NEXT begin with a period and will be displayed as a prompt to instruct the user to place another disk in drive B: for inspection.

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ATTRIB.COM and FLAGS.COM utilities

The FLG.BAT file described above uses the FLAGS command in two of its command lines. FLAGS is a program furnished with the Microsoft Programmer's Utility Pack, and its purpose is to set or clear the file attribute flags. ATTRIB is a program created by Pat Swayne, a listing of which is shown in the December 1984 issue of *REMark* mentioned in the section above on the IF command.

Both programs, FLAGS and ATTRIB, serve the same purpose, to set file attributes.

What are attributes? They are codes that serve to identify the type of file. We are concerned with the attributes designated by the codes R, H, and S. A Read-only file is identified with R, a Hidden file with H, and a System file with S.

To fully appreciate what is happening when the FLAGS command is executed, we must go back to the time the disk is formatted. When used with the /S switch, the format utility will (among other things) create a root directory and a directory listing for IO.SYS and MSDOS.SYS. A directory entry contains 32 bytes for each file.

The format program copies the IO.SYS and MSDOS.SYS files to the data areas of the disk, and then sets the attributes of each file in the directory listing.

These attributes are bit-mapped in the 11th byte of the 32-byte directory listing. Since they are bit-mapped, several attributes may be set at one time using a single byte.

File attributes are also called flags, hence the name FLAGS.COM for the utility which sets the attributes. In the FLG.BAT file listed above, the flags are set by the command FLAGS B:IO.SYS RHS. This command sets the IO.SYS file as a read-only file, as a hidden file, and as a system file.

Note the MS-DOS command line syntax—there are no slashes between the R, H, and S flags as is customary when switches are used in the command line. (For example, DIR/P.)

Flags are cleared by executing the FLAGS program and omitting the parameters from the command line.

SPELL vs. PeachText's speller

I wouldn't win any spelling beez, so I like a little support now and then—just to pick up the typos, you know. In the early days of PIE and Magic Wand there was SPELL, a program created by Robert Wesson and marketed by Walt Bilofsky of The Software Toolworks.

Two versions of SPELL have been produced. Version 1.0 runs under both HDOS and CP/M-80. This version compresses some 18,500 root words into a dictionary named DICTNARY.64K. The SPELL program contains an algorithm which supplies prefixes and suffixes to the root words, and this results in the equivalent of a 50,000-word dictionary.

SPELL is speedy; it looks up some 4,000 words a minute on an H89 working at 4 MHz. However, version 1 of SPELL is austere in its display, with no bells or whistles. The display does not inform the user about what SPELL is doing, nor about the rate of progress.

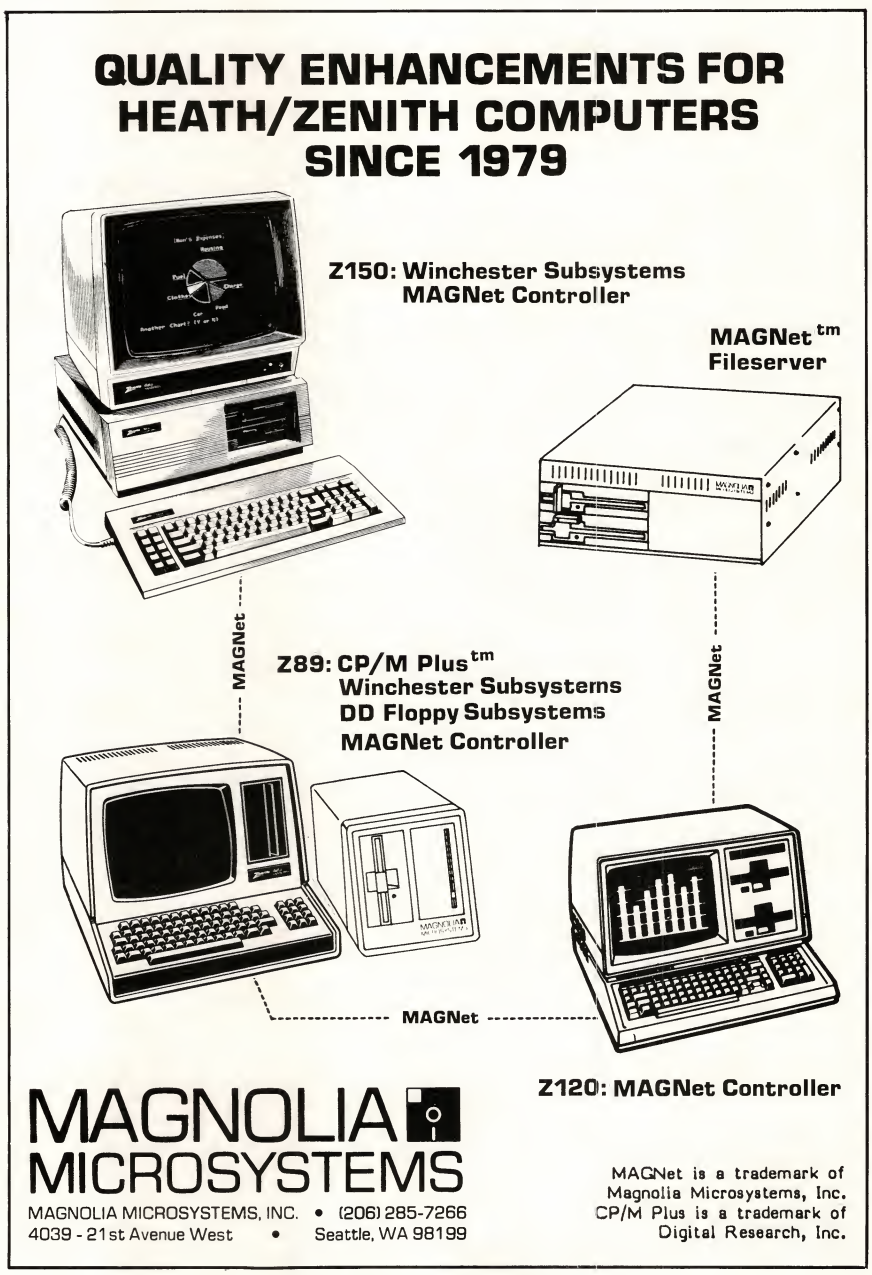
Version 2.0 of SPELL replaces Version 1.0. It is supplied for the HDOS, CP/M, and Z-DOS/MS-DOS operating systems. The Z-DOS/MS-DOS distribution disk contains a dictionary named DICTNARY.128 which has more root words than the dictionary provided with Version 1.0.

Version 2.0, while still a no-frills speller, does display progress as the text is being tested. It will detect spelling errors in text produced by the PIE, Magic Wand, WordPerfect, and PeachText 5000 editors.

SPELL's strong point is its extensive vocabulary. I have compared SPELL with the PeachText speller using a 4,600-word document. SPELL returned six mismatches for words which were correctly spelled.

PeachText's speller returned 50 mismatches for words correctly spelled—both root words and plurals. (I can do without this kind of spelling assistance.) All of PeachText speller's fancy screen work in no way compensates for its spelling deficiency.

At one time, I attempted to help the PeachText speller along by adding words to its dictionary, but this was like filling a salt shaker a grain at a time. I mentioned my displeasure to a knowledgeable friend who took issue with my assessment of the PeachText speller. He said that he and his fellow members used to get together at HUG meetings and swap



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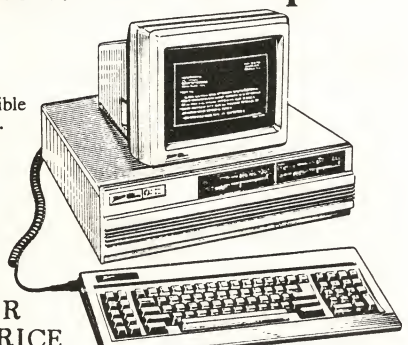

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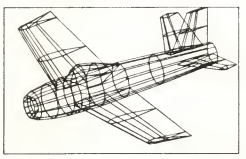

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lists of words to add to PeachText's dictionary (grin).

Summary: I am pleased with the power and simplicity of The Software Toolworks' Version 2 of SPELL. It is a great program for the price, and in my judgement is in a class above PeachText's speller.

ZP/SIM emulator supports SPELL.COM

This section was written prior to my purchase of Version 2 of The Software Toolworks' SPELL program. (I had become disillusioned with the PeachText speller.) I wanted to find out if Version 1 of the SPELL program supplied for CP/M-80 would check the spelling of a text that resided on an MS-DOS disk.

So, I purchased the ZP/SIM program, Version 1. ZP/SIM is also marketed by The Software Toolworks. It lists for $29.95.

ZP/SIM is a CP/M emulator. The purpose of ZP/SIM is to execute CP/M programs while running under the Z-DOS operating system. I could find nothing in the documentation to indicate that the ZP/SIM program would run under MS-DOS version 2; however, subsequent tests showed that it would.

ZP/SIM is simple to understand and use. The ZP/SIM distribution disk contains just one program, which occupies 8,192 bytes. Ten pages of documentation are furnished. Those CP/M programs which perform track/sector disk access, or which use codes unique to the Z80 CPU, are not supported by ZP/SIM.

To find out if the CP/M version of SPELL would perform properly when it was converted to MS-DOS format by ZP/SIM, I created an MS-DOS system disk and copied ZP/SIM and Zenith's RDCPM utility to it. Next, using RDCPM, I read SPELL.COM and its supporting files (AFFIXTAB.SPL and DICTNARY.SPL) onto the same MS-DOS disk.

Of course, a CP/M COM program that has been read to an MS-DOS disk will not execute. ZP/SIM remedies this situation by converting the CP/M program to a form that will execute under MS-DOS. In so doing, it adds about 2,500 bytes to the CP/M program. After the conversion, SPELL.COM can be treated as though it were an MS-DOS program.

I used ZP/SIM to convert SPELL.COM. (It was not necessary to convert AFFIXTAB.SPL or DICTNARY.SPL.)

Much to my satisfaction, I found that SPELL performed just as it should on a 4,600-word text recorded on the MS-DOS disk. The interesting thing about this procedure was that Version 1.0 of CP/M-80 SPELL, developed in 1981, performed properly on an MS-DOS operating system developed several years later.

Sources Mentioned

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The ultimate in word processing with speed and power. See the reviews in Remark (Jul 1985) and Sextant (Jan-Feb 1985; Sep-Oct 1985). Requires 192K RAM.

Price: $100
Demo Disk: $ 3
(Includes the Resident Speller Demo.)

The Resident Speller™
for the Z100

A spelling checker for use with WatchWord.

Check your spelling as you enter text from WatchWord. Includes a stand-alone spelling checker for ASCII files.

50,000 word expandable dictionary, requires 192K RAM (300K for use with WatchWord).

Price: $100

(Demo included on WatchWord Demo Disk.)

The Resident Speller™
PC Version for the Z150

Check your spelling as you type from most word processors.

Includes a stand-alone spelling checker for ASCII files.

50,000 word expandable dictionary. Requires 90K in addition to memory required by your word processor.

Price: $99
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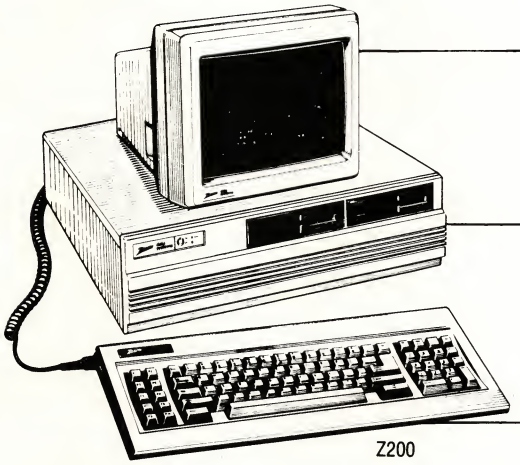

Z200

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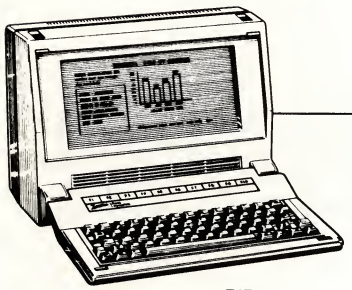

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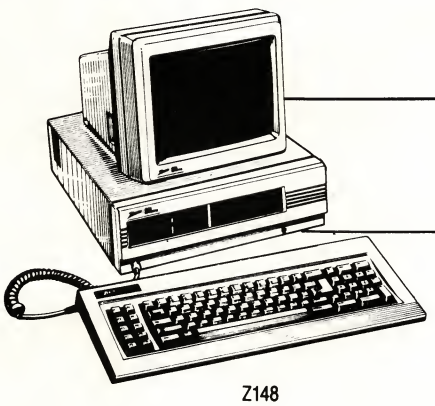

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Index to *Sextant* #1–#20

This index covers the first 20 issues of Sextant, *from Spring 1982 through this issue, January-February 1986.*

The articles are categorized by subject, and many of the articles are listed more than once. The first column of each entry contains the issue number. The page number is given after the title of the article. Back issues are available for $3.50 from Sextant.

Issue # **Article**

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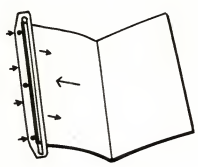

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Here are some of the highlights of each issue:

Sextant #1
Spring '82

• A Parallel Interface for the '89 • Disk Programming *Without* HDOS • Print Spoolers: A Background and Reviews • A Professional Writer Looks at Budget Word Processing

Sextant #2
Summer '82

• Crucial Secrets of HDOS Let You Write Device-Independent Programs • Preview of the Z100 • Put Some Structure in Your BASIC Programming • Renumbering Benton Harbor BASIC

Sextant #3
Fall '82

• The World's Fastest Sort? • Give Your '89 a Boot—Automatically! • Double-Precision Trig Functions • Graphics on Your H8

Sextant #4
Winter '83

• Interrupt Programming Under HDOS • Eight Spreadsheets Compared • Venturing Beyond the Heath/Zenith Disk Controller • A Survey of Disk Controller Alternatives

Sextant #5
Spring '83

• CP/M: The First 13 System Calls • Understanding HDOS • Improve Your H8's Reliability: Install the Trionyx Motherboard • Improve Your H8's Reliability: Add a Fan

Sextant #6
Summer '83

• Pascal Elucidated • Assembly Language Inside a Spooler • Squeeze More Disk Space Out of HDOS • Taking a Look at Magnolia's Invisible Disk • Passwords and Record-Keeping

Sextant #7
Fall '83

• Z100 Software Roundup—Over 80 Products for the Z100 • Make Your '8 Think Like an '89—Only Faster • dBASE II Comes to Heath/Zenith • Index Your HDOS Disks

Sextant #8
Winter '84

• Games Roundup • Getting Into Z-DOS Assembly Language—Quietly • Kids and Computers • Tracking Home Finances With the Home Finance System

Sextant #9
March-April '84

• Why Won't All That IBM-PC Soft-
SOLD OUT!
-STAND-ALONE • Build a Sound/Clock Board for Your '89

Sextant #10
May-June '84

• Windows Opens the Door to Compatibility • Color Graphics for Your '8 or '89 • Put an Electronic Disk into Your H8 • Graphics Algorithm Optimized for 8080 or Z80

Sextant #11
July-August '84

• Review of the IBM-compatible Z150 • Introduction to Pascal: Part 1 • Four Letter-Quality Printers Under $1000 • The Z67 Winchester: Use It With HDOS as Well as CP/M

Sextant #12
Sept.-Oct. '84

• Roundup of Z-DOS Communications Software • Introduction to Pascal: Part 2 • Communing By Computer—the HUG Bulletin Board • Forth Goes Heath/Zenith • Index to *Sextant* #1-12

Sextant #13
Nov.-Dec. '84

• Piggyback a Parallel Port on Your '89 • Introduction to Pascal: Part 3 • Making Z-BASIC Friendlier • Megabyte Memory for Your H8 • Moving Your Old CP/M Files to Your New Computer

Sextant #14
Jan.-Feb. '85

• Microsoft Word and Mouse: Do They Click? • TMSI's H-1000: Grafting an 8086 Onto Your '89 • WatchWord: Custom Built for You and Your Z100 • Put HDOS Commands on Disk

Sextant #15
March-April '85

• Salvage Memory Contents Under CP/M or MS-DOS • Quick and Easy Graphs on Your '100 and '150 • Another Approach to Command Processing Under HDOS

Sextant #16
May-June '85

• Great Graphics on the '19 and '89 • Speed Up Your '100 50% • A Critical Look at the 8088 • Add an Automatic Brightness Control to Your '89

Sextant #17
July-August '85

• Moving Up to MS-DOS 2 • Add Automatic Key Repeat to Your '89 or '19 • Affordable Graphics for the Z100 • A Versatile Printer Driver for CP/M

Sextant #18
Sept.-Oct. '85

• The Quest for the Ultimate Word Processor • Modify HDOS to Run MBASIC Programs From a Menu • SigmaSoft's Interactive Graphics Controller for the '89

Sextant #19
Nov.-Dec. '85

• Hardware and Software Alternatives for Speeding Up the Z100 • HDOS: A Software Clock and Other Enhancements • Upgrading the U.S. Robotics S-100 Modem

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6 MS seek, 320K disks $299.00
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6 MS seek, 320K disks $312.00
MITSUBISHI 4853 Setup, 96 TPI,
3 MS seek, 640K disks $319.00

HALF HEIGHT DISK DRIVES

MITSUBISHI M2896	8"	DS, DD, 48 TPI	$375.00
NATIONAL JA551-2	5.25"	DS, DD, 48 TPI	$122.00
MITSUBISHI M4851	5.25"	DS, DD, 48 TPI	$124.00
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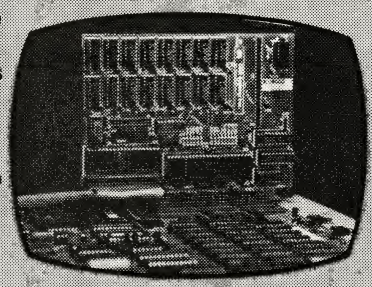
Using the Ram 89 package, standard software shows an immense improvement in speed. Depending on the software being run, programs may execute 10 times faster than when run through standard floppies.

Ram 89 comes as a two card set that plugs into the left hand (16k expansion) side of the computer. No computer modifications required.



Board 1 has two banks of 256k chips possible for a total of 512k. Either or both banks are able to use 64k chips instead. Board 1 can be used by itself, with board 2 added at a later date.

Board 2 has an additional 512k, plus it has a real time clock capability, and a SASI interface hardware capability. Board 2 piggybacks onto board 1.

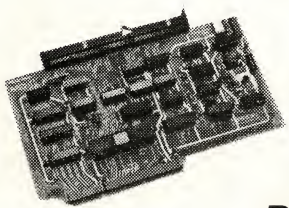
The Ram Drive Software (SRAM) allows one or two logical ram drives. The ram drive(s) can be located starting anywhere from logical A: to O: (standard drives get relocated). SRAM can be set to start at logical A: and warm boot with ram (no floppy disk accesses needed). Ram drive attatches to any of the versions of CP/M 2.2 bios used in the H/Z89-90.

GET A FULL MAGABYTE OF RAM FOR YOUR H/Z89-90

Board 1 includes hardware manual and ram drive software with no ram: $190.00. Each 256k bank, add $56.00. Board 2 (must have board 1). With no ram, no clock, no SASI $90.00. Each 256k bank, add $56.00. Ask about clock, SASI pricing.

FOR THE H/Z89-90 COMPUTERS

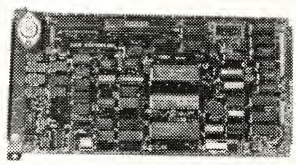
THE ONE CONTROLLER FOR 8" & 5.25" DRIVES THE FDC-880H PRICE: $395



Includes controller board CP/M boot prom, I/O decoder prom, hardware/software manuals BIOS source listing. HDOS driver now available for $50.00.

Now be able to run standard 8" Shugart compatible drives and 5.25" drives (including the H37 type) in double and single density, automatically with one controller. The FDC-880H operates with or without the Heath hard sectored controller.

THE FDC-H8 DOUBLE DENSITY 8" AND 5.25" CONTROLLER FOR THE H8 COMPUTER PRICE $495



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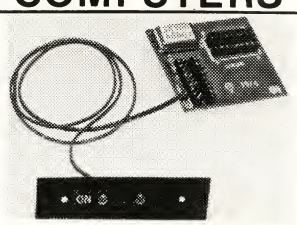

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Z-BASIC Battleship

Only a few lines need to be changed to run the MBASIC game, originally published in* Sextant *#7, under Z-BASIC.

Gil Hoellerich

Not too long ago, a retired Navy person received a promotional transfer at our school. As a humorous gift for him, we decided on a disk containing Clair Doughty's BASIC Battleship program. (See *Sextant* #7, Fall 1983.)

Since he uses a Z100, this required converting from Microsoft BASIC under CP/M to Z-BASIC under the Zenith Disk Operating System (Z-DOS). Although I was concerned that this would be a monumental task, I found that it was a rather simple conversion. A patch of three lines allows the use of this program on the Z100.

A simple patch

If any of you would like to run this program on your Z100, first change line 520's TAB(23) to TAB(21). Then replace lines 1280 and 1380 with the following:

1280 LOCATE Y,X: PRINT CH$

1380 LOCATE Y,X: PRINT C(M)

The entire program is shown in Listing 1.

And move it to a '100

To make the transition, I saved the program again in ASCII, as a precaution. Then, under CP/M, I PIPped it to a soft-sectored 48-t.p.i. disk on a Z90. Last, I used Z-DOS's RDCPM utility on the Z100 to place the program on a Z-DOS disk.

This conversion required a closer inspection of the code for BASIC Battleship than I had done before. I can now salute Mr. Doughty for a job well done. △

Gil Hoellerich is a part-time consultant and teacher; he teaches programming and computers at Northwest Vocational Technical School in Fayetteville, Arkansas.

```
100 REM BATTLESHIP PROGRAM
110 REM BY CLAIR DOUGHTY, 302 GRISWOLD ST., ELGIN, ILLINOIS 60120
115 REM MODIFIED BY GIL HOELLERICH
120 REM THIS PROGRAM USES H19/H89/Z90 GRAPHICS AND TERMINAL FUNCTIONS.
130 CLEAR
140 ES$ = CHR$(27):CL$ = ES$+CHR$(69):GR$ = ES$+CHR$(70)
150 RG$ = ES$+CHR$(71):RV$ = ES$+CHR$(112):VR$ = ES$+CHR$(113)
160 VT$ = CHR$(96):RT$ = CHR$(125):BL$ = "   ":BE$ = CHR$(7)
170 ML$ = BL$+RT$+BL$+VT$+BL$+VT$+BL$+VT$+BL$+VT$+BL$+VT$
180 ML$ = ML$+BL$+VT$+BL$+VT$+BL$+VT$+BL$+VT$+BL$+RT$
190 NO$ = "1"+BL$+"2"+BL$+"3"+BL$+"4"+BL$+"5"
200 NO$ = NO$+BL$+"6"+BL$+"7"+BL$+"8"+BL$+"9"+BL$+"10"
210 PRINT CL$:PRINT TAB(35);RV$;"BATTLESHIP";VR$
220 PRINT:PRINT:PRINT TAB(25);"PLEASE SELECT OPTION 1,2 OR 3!"
230 PRINT:PRINT:PRINT TAB(30);"GAME DIRECTIONS  -  1"
240 PRINT:PRINT TAB(30);"START GAME        -  2"
250 PRINT:PRINT TAB(30);"END GAME          -  3"
260 T$ = INKEY$
270 IF T$ = "1" THEN 300
280 IF T$ = "2" THEN 520
290 IF T$ = "3" THEN 1810 ELSE 260
300 PRINT CL$;TAB(35);RV$;"BATTLESHIP";VR$:PRINT
310 PRINT "This is a guessing game to locate the hidden ships. A map will be"
320 PRINT "drawn on the screen with numbers over each column and down each row."
330 PRINT "The description of each ship and it's symbol will be displayed to"
340 PRINT "the right of the map for your information. The game will start by"
350 PRINT "randomly selecting the hidden locations for the ships. During this"
360 PRINT "time, a message will be displayed asking you to wait while the ships"
370 PRINT "maneuver. To the left of the screen, you will be asked your selection"
380 PRINT "for the columns with the prompt - OVER?. Please answer with a number"
390 PRINT "between 1 and 10 and hit the RETURN key. Next you will be asked your"
400 PRINT "selection for the rows with the prompt - DOWN?. Please answer with a"
410 PRINT "number between 1 and 10. If you locate a ship, one of the symbols for"
420 PRINT "the ships will appear at the guessed location and a beep will sound."
430 PRINT "If you miss, an asterisk (*) will appear in the location. If you"
440 PRINT "pick a location that was previously chosen, you will see a message"
450 PRINT "to TRY AGAIN along with 2 beeps. The shots, hits, and misses will be"
460 PRINT "displayed for you. There are a possible 100 shots. You will be rated"
470 PRINT "by your score at the end of the game as the map is cleared of "
480 PRINT "asterisks to reveal the ship locations.":PRINT
490 PRINT "To start the game, press the S key":PRINT
500 A$ = INKEY$
510 IF A$ <> "S" THEN 500
520 PRINT CL$;GR$:PRINT TAB(5);RV$;"BATTLESHIP";VR$;TAB(21);NO$
530 FOR I = 1 TO 10:PRINT TAB(20)STRING$(40,97)
540 PRINT TAB(12)I;TAB(16)ML$:NEXT I
550 PRINT TAB(20)STRING$(40,97);RG$
560 FOR L = 302 TO 1102 STEP 80
570 N = L:READ CH$:GOSUB 1250:NEXT L
580 FOR L = 241 TO 561 STEP 80
590 N = L:READ CH$:GOSUB 1250:NEXT L
600 DIM A(10,10):DIM K(16)
610 FOR B = 1 TO 10:FOR E = 1 TO 10
620 READ A(B,E):NEXT E:NEXT B
630 PRINT RV$;BE$
640 N = 1262:CH$ = "SHIPS MANEUVERING":GOSUB 1250
650 N = 1342:CH$ = "PLEASE WAIT":GOSUB 1250
660 RANDOMIZE PEEK(11)
670 FOR C = 5 TO 1 STEP - 1
680 FOR F = 1 TO 2
690 W = INT(RND*2):T = INT(RND*11)
700 IF T < 1 OR T > 10 THEN 690
710 B(F) = T
720 NEXT F
730 G = C:O = B(1):D = B(2):H = 1
740 FOR G = G TO 1 STEP - 1
750 FOR J = 1 TO 15
760 N = A(D,O)
770 IF K(J) <> N THEN 860
780 IF C = 4 THEN J = 6
790 IF C = 3 THEN J = 10
800 IF C = 2 THEN J = 13
810 IF C = 1 THEN J = 15
820 FOR J = J TO 15
830 K(J) = 0
840 NEXT J
850 GOTO 680
860 IF K(J) <> 0 THEN 930
870 K(J) = N
880 IF W = 0 THEN D = D + H
890 IF W = 1 THEN O = O + H
900 IF D = 11 THEN D = D - C
```

Listing 1. The game "Battleship" for one player against the computer. Originally written by Clair Doughty in Microsoft BASIC under CP/M, the program is modified here for Z-BASIC under Z-DOS. Line 520 has a new TAB value, and lines 1280 and 1380 here replace those in the original.

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```
910 IF O = 11 THEN O = O - C
920 GOTO 940
930 NEXT J
940 NEXT G
950 NEXT C
960 PRINT VR$;BE$
970 T = O:N = 1262:CH$ = "                    ":GOSUB 1250
980 N = 1342:GOSUB 1250
990 CH$ = "OVER":T = O:N = 962:GOSUB 1250
1000 INPUT O
1010 CH$ = "      ":N = 1042:GOSUB 1250
1020 IF O > 0 AND O < 11 THEN 1040
1030 GOSUB 1110:GOTO 990
1040 CH$ = "DOWN":N = 1122:GOSUB 1250
1050 INPUT D
1060 CH$ = "      ":N = 1202:GOSUB 1250
1070 IF D > 0 AND D < 11 THEN 1090
1080 GOSUB 1110:GOTO 1040
1090 N = A(D,O)
1100 IF N <> 0 THEN 1140 ELSE GOTO 1030
1110 CH$ = "TRY AGAIN":N = 801:PRINT RV$;BE$:GOSUB 1250
1120 PRINT VR$:FOR X = 200 TO 1 STEP - 1:NEXT X:PRINT BE$
1130 CH$ = "         ":N = 801:GOSUB 1250:RETURN
1140 RESTORE 1800
1150 S = 1:T = 1
1160 FOR J = 1 TO 15
1170 READ CH$
1180 IF K(J) = N THEN 1210
1190 NEXT J
1200 CH$ = "*":S = 0
1210 GOSUB 1250
1220 A(D,O) = 0
1230 S = 0
1240 GOTO 990
1250 X = (N-(INT(N/80)*80)+1):Y = INT(N/80)+1
1260 IF S <> 1 THEN 1280
1270 PRINT RV$;BE$
1280 LOCATE Y,X: PRINT CH$
1290 IF T = 0 THEN RETURN
1300 C(1) = C(1) + S:C(3) = C(3) + 1:C(2) = C(3) - C(1)
1310 PRINT RV$
1320 FOR L = 321 TO 641 STEP 160
1330 M = (L - 161) / 160:N = L
1340 GOSUB 1370:NEXT L:PRINT VR$
1350 IF C(1) = 15 THEN 1400
1360 RETURN
```

➔

```
1370 X = (N-(INT(N/80)*80)+1):Y = INT(N/80)+1
1380 LOCATE Y,X: PRINT C(M)
1390 RETURN
1400 RESTORE 1790
1410 T = O:PRINT RV$;BE$:N = 1262:CH$ = "RATING :":GOSUB 1250
1420 FOR T = 25 TO 85 STEP 15
1430 READ CH$
1440 IF C(3) <= T THEN 1460
1450 NEXT T
1460 N = 1342:T = O:GOSUB 1250
1470 N = 1502:CH$ = "CLEARING MISSES":GOSUB 1250
1480 N = 1582:CH$ = "TO REVEAL PATTERN":GOSUB 1250
1490 PRINT VR$;BE$
1500 RESTORE 1690
1510 T = O:S = 3
1520 FOR B = 1 TO 10
1530 FOR E = 1 TO 10
1540 READ A(B,E)
1550 FOR J = 1 TO 15
1560 IF K(J) = A(B,E) THEN 1590
1570 NEXT J
1580 CH$ = " ":N = A(B,E):GOSUB 1250
1590 NEXT E
1600 NEXT B
1610 N = 1502:CH$ = "                    ":GOSUB 1250
1620 N = 1582:GOSUB 1250
1630 RESTORE 1650
1640 FOR Z = 600 TO O STEP -1:NEXT Z:GOTO 100
1650 DATA "CARRIER = CCCCC","BATTLESHIP = BBBB","DESTROYER = DDD"
1660 DATA "SUBMARINE = SS","PT BOAT = P"," ","NO. OF SHOTS = 100"
1670 DATA "MISS = *","HIT = C,B,D,S OR P","SHIPS MAY BE VERT."
1680 DATA "OR HORZ.","HITS"," ","MISSES"," ","SHOTS"
1690 DATA 260,264,268,272,276,280,284,288,292,296
1700 DATA 420,424,428,432,436,440,444,448,452,456
1710 DATA 580,584,588,592,596,600,604,608,612,616
1720 DATA 740,744,748,752,756,760,764,768,772,776
1730 DATA 900,904,908,912,916,920,924,928,932,936
1740 DATA 1060,1064,1068,1072,1076,1080,1084,1088,1092,1096
1750 DATA 1220,1224,1228,1232,1236,1240,1244,1248,1252,1256
1760 DATA 1380,1384,1388,1392,1396,1400,1404,1408,1412,1416
1770 DATA 1540,1544,1548,1552,1556,1560,1564,1568,1572,1576
1780 DATA 1700,1704,1708,1712,1716,1720,1724,1728,1732,1736
1790 DATA "FLEET COMMANDER","ADMIRAL","CAPTAIN","ENSIGN","SWAB"
1800 DATA "C","C","C","C","C","B","B","B","B","D","D","D","S","S","P"
1810 END
```

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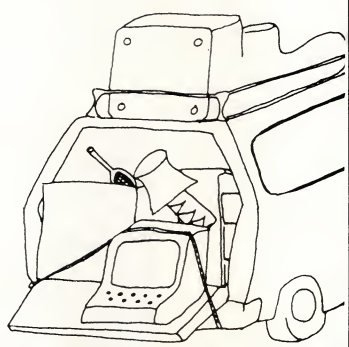

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```

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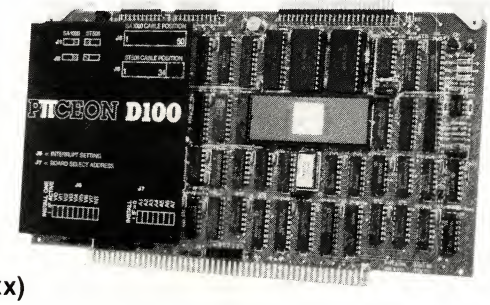

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Customizing muLisp for the '89 and '100

muLisp is easily customized to take advantage of Heath/Zenith terminal functions. The project makes a good introduction to Lisp.

Stanley Schwartz

Lisp is one of the oldest of the major computer languages still in use—and one of the most important, since it has come to dominate the areas of artificial intelligence, robotics, computer algebra, and natural-language interfaces. Lisp, which stands for LISt Processing, was originally developed for the IBM 704 computer by John McCarthy and the Artificial Intelligence group at the Massachusetts Institute of Technology.

Early versions of Lisp date back to 1960. But it may be the programming language least familiar to microcomputer users. This is due to its unjustified reputation for being difficult and esoteric and requiring too much memory and computer power for a micro.

These misconceptions have their roots in history. Lisp was developed and nurtured in an academic setting, each Lisp system evolving as a research tool in its own university, with little standardization. Moreover, the areas where Lisp dominates are somewhat removed from the mainstream of business and scientific computing, and they can require immense amounts of computer resources.

On the other hand, many of the features that make personal computers a pleasure to use are highly developed in Lisp systems. These include the use of interactive programming aids such as editors and formatters. Lisp also supports dynamic allocation of memory resources during program execution with recovery of unused space through "garbage collection." Your program can be run through a Lisp compiler in order to produce a version that runs on its own, or it can be run by a Lisp interpreter.

The emphasis in Lisp is on ease of programming in an interactive mode, and the manipulation of symbolic, as opposed to arithmetic, data. This makes it, like BASIC, an attractive language for many personal computer applications. As the power of personal computers grows, we can expect to see Lisp and its dialects, such as Logo, become more popular on general-purpose microcomputers.

Meanwhile, Lisp is advancing in the labs using specialized hardware, such as a special microprocessor chip under development by Texas Instruments for the Naval Electronic Systems Command. This chip will use the new Common Lisp dialect and will run at 40 megahertz. This is twenty times as fast as the Z80 chip in an H89!

Stanley Schwartz is a pathologist at the Memorial Hospital in Pawtucket, Rhode Island. He first learned Lisp when he became frustrated trying to write BASIC programs on his H89.

muLisp

muLisp is the most readily available and fastest microcomputer version of Lisp. Designed for any computer running either the CP/M operating system or the Microsoft Disk Operating System (MS-DOS), muLisp can easily be enhanced to make use of all of the special features that Heath/Zenith users have come to expect. (muLisp is a product of the Soft Warehouse of Honolulu, Hawaii, and is licensed to Microsoft. An older version, muLisp-80, is also available for Radio Shack and for Apple II computers.)

The muLisp system consists of four parts and comes on two single-sided 8″ CP/M disks or two single-sided 5¼″ MS-DOS disks. The first part is the interpreter itself. Next you get approximately 90 kilobytes of interactive tutorial lessons in muLisp programming. Third is about 34K of sample programs and 48K of function definitions in muLisp for functions from the MacLisp and InterLisp dialects. These are the most common dialects of Lisp on mainframe computers.

The fourth part is the "muStar Artificial Intelligence Development System." That is a fancy name for a programming environment: muStar consists of a full-screen, cursor-oriented editor, a debugging package, and a "pretty print" text formatter to present Lisp programs and data in indented, easily readable form.

muStar is a program written in muLisp. The muStar editor is designed to operate with any terminal, but performance can be greatly improved by customizing it for the H/Z19 terminal.

muLisp is a good bridge between different computers and operating systems, since the same source code will run without modification on systems using CP/M, CP/M-86, and MS-DOS. (But not the Heath Disk Operating System, alas!) I was able to move large programs—about 16 pages of printout—from an H89 using CP/M to a Z100, by direct disk transfer and the RDCPM utility under the Zenith Disk Operating System (Z-DOS).

The programs presented in this article will have most relevance to the latest version of muLisp/muStar, which is called muLisp-83. This new version has good compatibility with programs written under the earlier -80 and -82 versions, with major enhancements including random-access files and user-definable error traps. The operating-system interface has also been improved, as has the method for linking in your own assembly-language routines.

Where differences between versions are important, I will give explanations. Much of the material on terminal control will also be useful to users of Lisp/80 from The Software Toolworks. The extreme flexibility and extensibility of Lisp makes it possible to duplicate in one dialect almost any feature of another dialect. While the slow speed of Lisp/80 makes it less useful for real-time applications, it is a very useful and economical version, nonetheless.

The goal: terminal control

Since it is easy to customize muLisp to take advantage of the Heath/Zenith terminal functions, let's do so. We can start with the basics of terminal control and learn a little Lisp as we go. The programs we will end up with are CURSOR.LIB (List-

A Note for Users of Toolworks Lisp/80

The principles of terminal control discussed for muLisp will also work in Lisp/80 from The Software Toolworks. But some explanation of the ways in which muLisp differs from Lisp/80 may be necessary before you can convert the functions. (I assume in this section that you are already familiar with Lisp/80.)

Of course, the names and definitions of the built-in functions may differ between the two systems, but the most important and confusing differences are in the basic EVAL function itself and how iteration is handled. The COND form is optional in muLisp and is usually omitted to save space. For example, the body of the GRAPHICS function found in CURSOR.LIB could be written in both muLisp and Lisp/80. (See Listing A1.)

```
(GRAPHICS (LAMBDA (SWITCH)
  (COND
    ((NULL SWITCH) (ESCQ Q))
    (T (ESCQ F)) ) ))
```

Listing A1. The body of the GRAPHICS function found in CURSOR.LIB (Listing 8) could be written this way in both muLisp and Lisp/80.

All muLisp functions behave as if they were PROGNs, so the PRINT25 function might be written in Lisp/80, as shown in Listing A2.

```
(PRINT25 (LAMBDA (MS COL)
  (PROGN
   (SAVE-CUR T)
   (SET25 T)
   (CURSOR 24 (COND ((NUMBERP COL) COL)(T Ø)))
   (REVERSE-VID T)
   (PRTSEN MS)
   (REVERSE-VID) ) ))
```

Listing A2. Listing 8's PRINT25 function could be written in Lisp/80 in this manner.

muLisp does not have the PROG form, so iteration is handled by a special LOOP form; exit from the function body is achieved by an implied conditional illustrated in the RPT function of CURSOR.LIB. A Lisp/80 version is given in Listing A3.

```
(RPT (LAMBDA (NUM EXP)
  (PROG ()
    A (EVAL EXP)
      (COND ((ZEROP NUM) (RETURN NIL)))
      (SETQ NUM (SUB1 NUM))
      (GO A) ) ))
```

Listing A3. A Lisp/80 version of Listing 8's RPT function.

Of course, if you must have the PROG, GO, RETURN form in muLisp, you can add it. It is defined in the file INTERLIS.LIB, which comes with muLisp.

A Note for Users of muLisp-80:

The version of muStar supplied with muLisp-80 differs somewhat from that used in this article. The basic control functions are named for the control characters that activate them rather than for their functions. For example, the function DEL-LIN is called CTRL-Y in the old version. The correspondences are noted in the comments for each function in MUALTER.LIB.

The basic functions and control variables necessary to adapt the early muStar to use the Heath/Zenith terminal functions are different from what they are in the new version, but are well described in the muLisp-80 documentation. They should be easy to set up with this article as a guide.

There is one problem not mentioned in the muLisp-80 documen-

ing 8) and MUALTER.LIB (Listing 9). CURSOR.LIB will get muStar to recognize the Heath/Zenith function and keypad keys for invoking cursor-control and basic editing functions. MUALTER.LIB lets additional muStar functions use Heath/Zenith terminal features such as the 25th line, etc.

To make a handsome display, the most often needed terminal-control function is the clear-screen function. This is accomplished by sending to the '19 an ESCape character (ASCII 27) followed by an "E". (Remember, the H/Z110 and '120 computers use the same control codes as the '19 terminal and H/Z89 computer. I will usually just say '19 when I mean all of these machines.)

Rather than include the appropriate print statements wherever it is desired to clear the screen, the usual practice in BASIC is to set some variable with a mnemonic name to the two-character sequence above, and then print that variable. For example, in BASIC one might write:

```
10 LET ED$=CHR$(27)+"E"
. . .
200 PRINT ED$
```

The same method that we would normally use in BASIC will work in Lisp:

```
(SETQ CLRSCRN (PACK (LIST (ASCII 27)
 (QUOTE E))))
(PRIN1 CLRSCRN)
```

The analogy to the BASIC lines should be obvious. Briefly, SETQ is one of Lisp's assignment functions; it is similar to BASIC's LET. PACK takes a list of characters and combines them into what is called in Lisp an "atom," which here is used the way a string would be used. In this sense, PACK is used here like the BASIC string operator "+". LIST is a function which returns a list of its arguments. (QUOTE E) is much the same as "E". PRIN1 prints an expression but does not terminate the line.

Some fundamentals

Having the example above to indicate some of the similarities to BASIC, it may be well to look at some of the differences, too.

As noted, the name Lisp stands for "List Processing": all programs and data are stored as lists.

A list is a series of atoms and lists enclosed in parentheses. For example, HELLO is an atom, while (HELLO) is a list, since it is an atom enclosed in parentheses.

Using Lisp's standard list-processing functions, a list can not be broken down into any parts smaller than a Lisp atom—just as a molecule can not be broken down into parts smaller than an atom of matter using chemical reactions. Like a "chemical atom," a Lisp atom can have a complex internal structure.

It may seem odd to think of a program as merely a "list." In BASIC, we use conventions that sound a lot like ordinary speech or at least like ordinary algebra: LET A=B+C, for instance.

Lisp can accomplish the same ends

```
(DEFUN CURSOR (LAMBDA (ROW COL LINELENGTH READCH RDS)
  ((AND (NUMBERP ROW)(NUMBERP COL))
    (ESC (QUOTE Y)
     (CDR (ASSOC ROW CURSOR))(CDR (ASSOC COL CURSOR))) ) ))

(SETQ CURSOR (QUOTE (
(Ø . " ") (1 . !)
(2 . """) (3 . #)
(4 . $) (5 . "%")
(6 . &) (7 . "'")
(8 . "(") (9 . ")")
(1Ø . *) (11 . +)
(12 . ",") (13 . -)
(14 . ".") (15 . /)
(16 . Ø) (17 . 1)
(18 . 2) (19 . 3) (2Ø . 4) (21 . 5) (22 . 6) (23 . 7) (24 . 8) (25 . 9)
(26 . :) (27 . ;) (28 . <) (29 . =) (3Ø . >) (31 . ?) (32 . @)
(33 . A) (34 . B) (35 . C) (36 . D) (37 . E) (38 . F) (39 . G) (4Ø . H)
(41 . I) (42 . J) (43 . K) (44 . L) (45 . M) (46 . N) (47 . O) (48 . P)
(49 . Q) (5Ø . R) (51 . S) (52 . T) (53 . U) (54 . V) (55 . W) (56 . X)
(57 . Y) (58 . Z) (59 . "[") (6Ø . \\) (61 . "]") (62 . ^) (63 . _)
(64 . `) (65 . a) (66 . b) (67 . c) (68 . d) (69 . e) (7Ø . f) (71 . g)
(72 . h) (73 . i) (74 . j) (75 . k) (76 . l) (77 . m) (78 . n) (79 . o)
)))
```

Listing A4. Since muLisp-80 does not have an ASCII function, Listing 8's CURSOR function must be modified to use an association list of screen coordinates and ASCII characters.

tation. This concerns the lack of an ASCII function in muLisp-80. Since there is no ASCII function, there seems to be no way for a program to generate an ESCape character for terminal control from within a program. An attempt to enter an ESCape character from the keyboard (with the ESC key) causes a break to occur. In muLisp-80, unlike muLisp-83, the character which causes a break when typed on the keyboard is permanently set to the ESC character.

The solution is to read the ESCape character from an external file created with a text editor. Here is the necessary statement:

(SETQ ESC "^[")

(The quote marks are necessary. Use the actual non-printing ASCII escape character, not the sequence ^[.)

Depending on which editor you use, it may be difficult to get a non-printing character into a text file. For example, with the PIE editor from The Software Toolworks you must type a CTRL-K followed by a CTRL-[, where CTRL-K means to press the CTRL key and the K key at the same time. CTRL-[generates the same code as the ESC key. You can't just use the ESC key, since PIE uses that key for cursor control.

Then, wherever you see (ASCII 27) in the program listings use ESC instead.

Without an ASCII function, we must modify CURSOR.LIB's CURSOR function to use an association list of screen coordinates and ASCII characters for cursor control. This method is fast enough for most purposes. (See Listing A4.)

In adapting earlier versions of muLisp to handle the functions in CURSOR.LIB, a major limitation comes in dealing with the special-function keys. The character to cause a break from the terminal in muLisp-80 is permanently set to the escape character (ASCII 27), and the break system itself is not under total user control as it is in the new version. Because of this, there is no way to use the special-function keys or the cursor position report (ESC n) feature of the terminal, since such a use generates a break.

Also, the function COL# will not work; and the alternate definition of CURSOR does not return the column number when called without arguments.

with "just a list" because the way we *structure* the list tells Lisp how to deal with the items in the list. Take the clear-screen example above. There is an equivalent for LET and for +, but not for the = sign. Instead, that's implicit in SETQ.

Basically, one item in the list will tell you how to deal with succeeding items. SETQ can be translated as "engage in the operation of setting the atom (name) that follows immediately equivalent to the next list you see." PACK can be translated as "engage in joining the characters (items) in the list that follows immediately." In each case, a term like SETQ or PACK indicates how we treat the succeeding items.

A simple case of math might serve as an example. In BASIC, we might use the form 4 * (3 + 6). In Lisp, we would use the form (* 4 (+ 3 6)). Here, the multiplication and addition operators act as prefixes to the values which are their arguments.

This "prefix" notation may seem strange, but it has two important advantages. First it allows one operator to act on many arguments. You can say (+ 2 3 4 5) instead of 2 + 3 + 4 + 5.

More importantly, it allows for syntactic uniformity throughout the language. In Lisp, all statements use this prefix form. In BASIC, we have a complex combination: statements with key words work one way, those with mathematical operators another way, and those with functions still another way. In Lisp, there are very few possible kinds of syntax errors.

(I said above that Lisp stores all programs and data as lists. I should note that this is not strictly true for muLisp—although it *looks* that way to the user. muLisp compiles function definitions into a very compact form by the function PUTD. When needed, the original list can be re-created by the function GETD. To the user, all this is invisible; the form of programs and data is identical in both muLisp and Lisp.)

Atoms versus variables

So far, we see little difference between a Lisp atom and a BASIC variable. Both have a name and a value.

The Lisp atom, however, is somewhat more flexible in that the name can be a string of any length, while the names of BASIC variables are usually restricted to a few characters. Also, the value of a Lisp atom can be any Lisp data structure, that is to say, any atom or list of any size.

For example, the value of the atom BEATLES might be the list

(JOHN PAUL GEORGE RINGO)

Or the value of the atom might be a complex list such as

(THIS IS (AN EXAMPLE) OF (A) LIST)

The preceding list is made up of six elements, including four atoms and two lists. The lists are (AN EXAMPLE) and (A). Since a Lisp program is itself a list, the value of a "variable" in Lisp can be a program! It is this power to operate on programs as data that makes it relatively easy to write Lisp editors like muStar in

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```
100 LET C5=X             ;The subroutine expects variable C5
110 GOSUB 900            ;Transfer to the subroutine
120 LET X=C6 * 5         ;Multiply the value returned by 5
.
.
900 ;SUBROUTINE TO COMPUTE THE CUBE
910 LET C6=C5*C5*C5
920 RETURN
```

Listing 1. A BASIC program fragment to take a variable, find its cube, and multiply that by five. See Listing 2 for a Lisp equivalent.

```
(DEFUN CUBE (LAMBDA (#)   ;Ignore the "LAMBDA" for now
  (TIMES # # #) ))        ;Return # cubed.

(SETQ X (TIMES (CUBE X) 5))
```

Listing 2. A Lisp routine to find a number's cube and multiply it by five. (See Listing 1 for a BASIC version.)

```
(DEFUN CLRSCRN1 (LAMBDA ()  ;CLRSCRN1 will take no arguments
  (PRIN1 (ASCII 27))        ;Print the ESCAPE character
  (PRIN1 (QUOTE E)) ))      ;Print an "E", and return "E"
```

Listing 3. CLRSCRN1 is a first attempt at providing a screen-control function (clearing the screen) in Lisp.

Lisp.

The value of a BASIC variable is restricted and inflexible since it can be only a number or string of limited size; and the same variable may not have both numbers and strings as its value. Although the value of a Lisp atom can be a list, the value of a BASIC variable can be only a number or string, not an array.

Unlike a BASIC variable, a Lisp atom is a complex structure which has not only a name and value, but many other features as well. These features are kept on the "property list" of the atom. The "property list" effectively allows an atom to have more than one value, depending on circumstances. For example, the atom JOHN—SMITH might have an "ADDRESS" property. If so, the statement (GET 'JOHN—SMITH 'ADDRESS) would return as its value John's address. This feature makes it easy to set up simple data bases with a minimal amount of programming.

In CURSOR.LIB, I put function names on the property lists of the characters that are sent by the special-function keys. (See Listing 8 under "Special Function Keys." These functions are evaluated when the function keys are hit. This is explained in the section "The control and special-function keys," below.)

Some versions of Lisp, such as Lisp/80, even store function definitions and the "value" of the atom on the property lists of the atoms! In other versions, such as muLisp, function definitions are kept in a special function-definition cell which is separate from the property list of each atom.

No arrays

Arrays are not a natural part of the Lisp language. They are supported in large Lisp systems, along with many other data types, such as "structures" like those in C; but they are not necessary and are often omitted from microcomputer Lisps and Lisp textbooks.

The thought of a computer language that does not use arrays seems strange to programmers used to BASIC. The concept of the array is one of the most difficult parts of BASIC for the novice. But we become so used to arrays that they begin to seem the natural way to arrange information in a computer. For most uses, as we will see here, lists can be much easier to use than arrays.

Functions: an important tool

Although the clear-screen method given above seems straightforward, it is not the best way to do things in Lisp. When applied to a number of terminal functions, the method above results in a large number of global variables. These are hard to keep track of and are potential points of confusion. If you used the same name as a local variable, then you would not be able to clear the screen in those parts of the program for which the local variable was defined.

The solution in Lisp is to define a function to clear the screen.

Functions are also useful in BASIC, but are under-used by many programmers, so let's briefly discuss how they differ from subroutines.

Both functions and subroutines allow you to write a bit of code once and use it many times. You enter a subroutine by means of a GOSUB command. The subroutine ends with the statement RETURN, which transfers control to the statement after the GOSUB.

As an example of a subroutine, the fragment of BASIC program in Listing 1 takes the variable X, finds its cube, and multiplies this by five.

This fragment illustrates several problems that make the writing and maintenance of BASIC programs difficult. The programmer must remember that the "cube" subroutine is called by the very non-mnemonic number 900. Also, this subroutine must receive its input in the variable C5 and returns the answer in the variable C6. This is difficult to remember; and confusion may result if these variable names are used elsewhere in the program for another purpose.

For very short subroutines, these problems can be solved by the use of a function. A function is a statement that is replaced by its calculated value during program execution.

For example, most versions of BASIC contain the function LEFT$(N1,STRING). This returns the leftmost n1 characters in a string. If X$ is a variable with the value THIS IS A STRING, then the value of LEFT$(6,X$) is THIS I.

Most BASICs allow the programmer to define short new functions. So we can define a CUBE function by placing the following line in our program:

```
10 DEFN CUBE(C) C * C * C
```

Then the program fragment may be simplified to:

```
100 LET X=CUBE(X) * 5
```

The programmer need no longer remember the line number of the subroutine or the names of the input and output variables. Time is saved and the chance for error is reduced.

Unfortunately, user-defined functions in most dialects of BASIC may be no longer than one line, while the typical subroutine can be many lines long.

In contrast, all program statements in Lisp are functions. The process of programming in Lisp consists totally of defining new functions. In Lisp, the example above looks like Listing 2.

Note that function calls may nest to any depth.

When the Lisp interpreter attempts to evaluate a list such as (TIMES (CUBE 2) 5) it goes through several steps. The first item on the list (here TIMES) is taken to be the name of the function to be called. Later items in the list, the "arguments" for TIMES, must be themselves evaluated first in order to have values to pass to TIMES. In this example, the evaluation proceeds from inside out like this:

Since TIMES is the first item on a list, it must be the name of a function, with (CUBE 2) and 5 as arguments.

Since CUBE is the first item on a list, it must be a function name,

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with the argument 2.
The value of 2 is 2 itself.
The value of (CUBE 2) is 8.
The value of 5 is 5 itself.
The value of (TIMES 8 5) is 40, so return 40.

Now let's make our first attempt at a Lisp screen-control function. Since it is our first attempt, we will call it CLRSCRN1. (See Listing 3.)

The function CLRSCRN1 is quite different from the earlier CUBE function. The most obvious difference is that there is nothing on the parameter list of CLRSCRN1; that is, the parentheses after the LAMBDA are empty.

The next difference is that CUBE was defined to let the calling function (in the example above, TIMES) make use of the value that is returned to it. But we don't care what value CLRSCRN1 returns. We defined the function to make use of its "side effect" of clearing the screen.

PRIN1 is another example of a Lisp function usually used for its side effect instead of its value. PRIN1 prints its argument to the current output sink (here the console). That argument is then returned as the value of PRIN1. DEFUN associates a name with a function definition so that the function can be referred to by name. That name is returned as the value of DEFUN.

The similarity we can see is the presence of LAMBDA immediately after the name of the function. LAMBDA is a form for the definition of a function. (We'll get into it in the next section.) The list following LAMBDA will be the function's list of parameters. That will be followed by the "body" of the function—in our case, the two print statements.

By this point, you may have noticed a big difference between Lisp and BASIC. In BASIC, there is a distinction between built-in functions, user functions, and key words (such as PRINT and LET). You can add new functions but not new key words. And you use key words and functions differently.

In Lisp, user functions are treated just the same as the built-in functions; in programming, you see no difference between functions that were originally part of the system in machine language and ones that you define. In other words, Lisp is "extendable." The process of programming in Lisp is the process of extending the language itself. In fact, a complete (but slow) Lisp system can be written using a very small subset of the language.

Back to screen control

But enough digression. Back to screen control. To control the '19 screen, we print escape sequences, that is, the ASCII ESCape character followed by one or more other characters. Since escape sequences are used so often, we might as well package the process into a function which we will call ESC1.

Our second try at CLRSCRN is given in Listing 4.

This is a good time to talk about that QUOTE in the function definition.

The value of a "numeric atom" is the number itself. In the case of a "non-numeric atom" such as E, the value is whatever has been set with an assignment function such as SET or SETQ. Since we want the E character itself, and not the value of a variable, we must protect E from evaluation. This is done with the QUOTE function, which returns its argument unevaluated.

It is very common to want to pass an argument unevaluated, so there are several ways to make this process easy. First of all, in most Lisps you can use " 'something" to stand for "(QUOTE something)". Here the " ' " is an example of what is called a "read macro." When Lisp's READ function sees a character which has a read-macro function definition, it evaluates that function and puts the returned value (QUOTE) in the input stream in place of the character.

In the case of the " ' ", the definition is (LAMBDA ( ) (LIST (QUOTE QUOTE) (READ))). The result is that a list is built up with QUOTE as the first element and whatever is to be read in next as the second element.

LIST and READ are standard Lisp functions. LIST returns a list of its arguments. For example, the value of (LIST 'A 'B (PLUS 3 4) 'D) is (A B 7 D). READ reads a symbolic expression from the terminal (which is to say, a name, a number, or an expression in parentheses).

Look at the CUBE example again (in Listing 2).

You will see the function SETQ, which seems to receive its first argument X quoted and its second argument (TIMES (CUBE X)) in the regular way. In a LAMBDA, all arguments are evaluated. If you wish to define a function that gets its arguments unevaluated, just replace LAMBDA with NLAMBDA in the definition. Of course, QUOTE itself is an example of a function defined with an NLAMBDA. The name SETQ is short for SET QUOTE.

LAMBDA and NLAMBDA tell the interpreter whether or not to evaluate the arguments to the function before binding them to the parameters, the list of "dummy" names that appear in a list after the LAMBDA or NLAMBDA in the function definition.

Actually, the body of a function does not need to be defined with DEFUN in order to be used; DEFUN is needed only if the function needs to have a name! Using our example of the CUBE function, the following two statements would give the same results: (CUBE 3) and ((LAMBDA (X) (TIMES XXX)) 3).

A LAMBDA expression can stand anywhere that a function name can appear. For an example of such an expression, see the function PRTSEN in CURSOR.LIB. If we had defined a function PRIN-SPACE as

```
(DEFUN CLRSCRN2 (LAMBDA ()
  (ESC1 (QUOTE E)) ))

(DEFUN ESC1 (LAMBDA (CODE)  ;Our first try at an ESC function.  "CODE"
  (PRIN1 (ASCII 27))        ;is a local name to stand for what you call
  (PRIN1 CODE) ))           ;the function with. Any name would do.
```

Listing 4. A second attempt at a clear-screen function. This incorporates a first attempt (ESC1) at including a function to handle ESCape (ASCII 27) sequences.

```
(DEFUN CLRSCRN (LAMBDA ()  ;Final version!
  (ESCQ E) ))              ;We don't "quote" the E

(DEFUN ESCQ (NLAMBDA (CODE) ;Short for ESCape QUOTE
  (PRIN1 (ASCII 27))        ;This is an NLAMBDA function!
  (PRIN1 CODE) ))
```

Listing 5. Using an NLAMBDA function eliminates the need to QUOTE the character used in an ESCape sequence.

```
(DEFUN ESCN (LAMBDA (CODE1 CODE2 CODE3)
  (PRIN1 (ASCII 27))  ;Print ESC
  (PRIN1 CODE1)
  ((NULL CODE2))      ;exit if no code2
  (PRIN1 CODE2)
  ((NULL CODE3))      ;exit if no code3
  (PRIN1 CODE3) ))
```

Listing 6. A general ESC function that can handle ESCape sequences of any length.

```
(DEFUN ESC (LAMBDA CODE
  (PRIN1 (ASCII 27))
  (LOOP
    (PRIN1 (POP CODE))  ;print the first code, reset CODE
    ((NULL CODE)) ) ))  ;if CODE list empty, exit
```

Listing 7. The final and most general form of the ESC function.

```
(DEFUN PRIN-SPACE (LAMBDA (ATM) (PRIN1
 ATM) (SPACES 1)))
```

we could have written the third line of PRTSEN this way:

```
(MAPC$ LST 'PRIN-SPACE)
```

In the case of '19 screen control, many of the escape sequences are only one character long and require no evaluation, so we might as well eliminate the need to QUOTE by using an NLAMBDA function like the one in Listing 5.

Several of the terminal features require more than one character code, so we should write a general ESC function that will handle codes of any length. At first glance, we might write it as shown in Listing 6.

This does not really do the job, since it can only handle three codes or less. The usual type of Lisp function requires a specific number of arguments. This type of function is called the "spread" type. What this means is that when a function is called, the arguments are matched up with (or "spread over") the items on the parameter list that appears in the function definition.

The parameters of the function are the atoms in the list that comes after the LAMBDA or NLAMBDA in the function definition. If there are more arguments than parameters, the excess ones are discarded. If there are more parameters than arguments, the extra parameters are bound to NIL, the empty list. They may be used as local variables.

(NIL, by the way, wears two hats: one as an atom, standing for logical false; and another as a list, the empty list. These are the same, but NULL is used to emphasize when the empty list is meant; NOT is used to emphasize when false is meant.)

What we need is a function type that can deal with any number of arguments. This type exists and is called "no-spread." A no-spread function has a single name after the LAMBDA or NLAMBDA without parentheses. All of the arguments of the function are gathered up and passed as a single list which is bound to the single parameter. In this way, the same function can deal with one argument in one case and a thousand in another.

Good examples of a no-spread are the functions PLUS and TIMES. In muLisp-83 (but not in muLisp-80 or Lisp/80), these functions can take any number of arguments. PLUS returns the sum of its arguments, while TIMES returns the product. For example, (TIMES 2 3) gives 6 while (TIMES 1 2 3 4 5 6 7 8 9 10 11) gives 39916800. (Note that there is no practical limit on the size of integers in muLisp.)

Our final, and general, ESC function is given in Listing 7.

You can see examples of how to use the functions we have just discussed in the annotated program listing CURSOR.LIB (Listing 8).

CURSOR.LIB will be a patch to muStar. In CURSOR.LIB, the functions shown above are used to control the terminal in the functions BELL, CURSOR, SAVE-CUR, ERASE, etc. (Many of these perform the named function if called with a "true" argument and the opposite if called with a "false" argument or no argument.) In CURSOR.LIB, I have included only the most commonly needed terminal functions. Others may be defined using these as examples.

The time and date

The Z-DOS version of muLisp has a built-in TIME function which returns the elapsed time in hundredths of a second. The clock is reset to zero by calling TIME with a non-null argument. TIME is useful for testing your programs for the most efficient algorithm.

The muLisp TIME function is not the same as the Z-DOS TIME command! The Z-DOS system clock, which is controlled by the Z-DOS TIME and DATE commands, is not changed by the muLisp TIME function; so you have access to two independent timers, one from muLisp and one from Z-DOS.

At the end of the program listing CURSOR.LIB, I have provided functions to read and set the Z-DOS system 24-hour clock and date from within muLisp. The functions in this section use some of muLisp's extensive features for interfacing with the machine and operating system. They make the use of assembly language unnecessary for most purposes.

The CP/M version of muLisp does not have a TIME function. However, CP/M's basic input/output system (BIOS) for the H/Z89 maintains a two-millisecond clock at memory locations 11 and 12; so, we can also provide a TIME function for CP/M muLisp. Since the CP/M clock is only two bytes long, it can only time events less than about two minutes long, unlike the Z-DOS version which can also be used as a 24-hour clock. This function is defined in CURSOR.LIB.

Remember, do not enter this function definition if you are using Z-DOS. This would replace the built-in machine language TIME function with one that will only work with CP/M!

The muStar editor

You enter muStar by typing MULISP MUSTAR from the operating system command line—or (LOAD MUSTAR) from the muLisp prompt. After a few seconds,

muStar displays an option menu from which you can choose to edit function definitions, variables, or properties; you can read or write program library files; you can use several debugging aids; and you can run Lisp or exit to the operating system.

Since muStar is a Lisp program editor, it automatically checks for balanced parentheses and displays all text in indented, "pretty-printed" form. Programs that are developed and debugged with muStar may be run without muStar, freeing up about 13K of additional space for data.

When in the edit mode, muStar is a typical full-screen editor where the screen is a window on a larger amount of text. The window and the cursor within the window are moved WordStar-fashion by control keys. (For example, CTRL-D moves the cursor forward one character, CTRL-F one word.) Word-wrap, word-search, text insertion, and single-line in-

Some More Lisp Basics

Lisp has many functions that act on lists, but most of them can be seen as repeated applications of the three basic list-processing functions. These are called CAR, CDR (pronounced "coodra"), and CONS.

Let's take a sample list and see what CAR, CDR, and CONS do to it.

First, let's set up a list by typing:

```
(SETQ SAMPLE '(HEATH (AND ZENITH)
 COMPUTERS))
```

Now, the value of the atom SAMPLE is the list

```
(HEATH (AND ZENITH) COMPUTERS)
```

The atom SAMPLE is acting here like a variable, where the name SAMPLE can stand in place of the value, which is too long to type each time.

CAR returns the first element of a list, so the value of (CAR SAMPLE) is HEATH. A better name for CAR might be FIRST. CDR returns the rest of the list without the first element or CAR, so the value of (CDR SAMPLE) is ((AND ZENITH) COMPUTERS). A better name for CDR might be REST. The last of our trio of functions sticks a new element on the front of a list. So the value of

```
(CONS '(I LIKE) SAMPLE)
```

is

```
((I LIKE) HEATH (AND ZENITH)
 COMPUTERS)
```

CONS is short for CONStructor.

The names CAR and CDR relate to the first hardware implementation of Lisp. These names are retained for historical reasons, and also because they make it easy to write compound forms. These compound forms begin with C and end with R and have A's and D's in the middle to represent repetitions of CAR and CDR operations. For example, (CAAR LIST) is the equivalent of (CAR (CAR LIST)). The function CADR returns the *second* item on a list. Can you tell why?

It is simple to use the basic list-processing functions to make more complex ones. As an example, let's make a function to tell us how long a list is.

We'll call this function HOW-LONG, to distinguish it from the built-in Lisp function LENGTH which does the same thing. HOW-LONG is given in Listing B1. In our definition, we will use the function NULL which detects the atom NIL.

```
(DEFUN HOW-LONG (LAMBDA (LIST) ;HOW-LONG is called with a list
  (COND                        ;If
    ((NULL LIST) Ø)            ;LIST has no members, length is Ø
    (T (PLUS 1 (HOW-LONG (CDR LIST))))) ))
                               ;Otherwise, length is one more than
                               ;the value of HOW-LONG of the list
                               ;without the first element.
```

Listing B1. An example of using the basic list-processing functions to make more complex ones. This is a simple recursive function, HOW-LONG, to tell us how long a list is. (See Listings B2-B4 for other methods of accomplishing the task.)

```
(DEFUN HOW-LONG-ITERATIVE (LAMBDA (LIST %Local:% LEN)
  (SETQ LEN Ø)                  ;initialize temporary variable
  (LOOP
    ((NULL LIST) LEN)           ;end of list? return LEN
    (POP LIST)                  ;reset LST
    (SET Q LEN (PLUS 1 LEN)) ) ))  ;increment counter
```

Listing B2. An iterative version of HOW-LONG (Listing B1). Another version, in the style of Lisp/80, is given in Listing B3.

```
(DEFUN HOW-LONG-ITERATIVE-LISP/8Ø (LAMBDA (LIST)
   (PROG (LEN)
     (SETQ LEN Ø)
     A
     (COND ((NULL LIST)(RETURN LEN)))
     (SETQ LIST (CDR LIST))
     (SETQ LEN (PLUS 1 LEN))
     (GO A) ) ))
```

Listing B3. An iterative version of HOW-LONG (Listing B1) in the style of Lisp/80.

```
(DEFUN HOW-LONG (LAMBDA (LIST)
  ((NULL LIST) Ø)    ;the length of the null list is Ø
  (PLUS 1 HOW-LONG (CDR LIST))) ))
                     ;the length of any other list is the
                     ;length of the first element (1) plus
                     ;HOW-LONG of the rest of the list.
```

Listing B4. A terse recursive version of Listing B1.

NIL is the only Lisp object which is both a list and an atom. As an atom it represents the logical value FALSE. It is also the list which contains no elements. When used as a list, NIL may be written ( ). All lists end with NIL, although this is not seen in the usual notation. For example, the value of (CDR '(HARRY)) is ( ) or NIL.

A bit of recursion

The function HOW-LONG, above, is an example of a simple recursive function. Listing B2 shows an iterative version. Listing B3 is an iterative version in the style of Lisp/80, which uses the traditional Lisp iterative structure, the PROG. And Listing B4 is a recursive version in usual terse muLisp style.

You will note that the recursive version is a fraction of the size of the other versions, does not use any temporary variables, and does not use any assignment statements. This greatly reduces the potential for bugs. This is a simple example because it is short, with only one conditional, has only one recursive call, and does not CONS to build new lists.

Recursive functions are very useful in list processing, searching, etc. The notation of Lisp was originally adopted for expressing recursion.

sertion are included.

muStar is intended to work on almost any simple terminal, but it must be customized for each terminal type, and it does not take advantage of special terminal features. In the form in which you receive it, for instance, muStar does not let you use the cursor-control arrow keys on the '19, '89, and '100.

muStar requires that the functions CLRSCRN, HOME, UPLINE, and BACKSPACE be defined for each terminal type, and that the variables LINELEN, PAGELEN, and INDENT be set for the screen size of your terminal. This is easy with the latest version of muStar since these functions are defined for you for many terminals in sample files on the distribution disk. The Heath/Zenith version is called CURSOR.ZEN. It contains the bare bones necessary to get muStar working.

I should note that my versions of the CLRSCRN, HOME, UPLINE, and BACKSPACE functions in CURSOR.LIB are somewhat

```
1000 ;BASIC SUBR TO ADD NAME      ;The name is in T$.
1010 FOR I=1 TO 100               ;Check an array with 100 elements
1020 IF T$ = T1$(I) GOTO 1080     ;named T1$ for a match.
1030 IF T1$(I) = "" GOTO 1070     ;We found an empty slot!
1040 NEXT I
1050 PRINT "NO MORE ROOM"         ;The array is full, with no match!
1060 GOTO 1080
1070 LET T1$(I) = T$              ;Fill the empty slot with the name.
1080 RETURN

100 LET T$="JOHN"
110 GOSUB 1000
```

Listing B5. A BASIC subroutine to receive a person's name and determine if the name is already in an array; if not, it is added to the array. Compare this to a Lisp function to accomplish the same end. (See Listing B6.)

```
(DEFUN ADJOIN                     ;Define a function named
  (LAMBDA (NAME LIST)             ;ADJOIN.
    (COND                         ;If
      ((MEMBER NAME LIST) LIST)   ;the name is on the list, return list.
      (T (CONS NAME LIST))  ) ))  ;otherwise, return the list with the
                                  ;name added on the front.

(SETQ PARTY_LIST (ADJOIN 'FRED '(SAM JUNE FRED MARY)))

;The value of PARTY_LIST is still (SAM JUNE FRED MARY)

(SETQ NEW_LIST (ADJOIN 'JOHN 'PARTY_LIST))

;The value of PARTY_LIST is unchanged.  ;NEW_LIST has the value (JOHN SAM
JUNE FRED MARY)
```

Listing B6. This Lisp function accomplishes the same task as the 11-line BASIC subroutine given in Listing B5.

The usefulness of lists

As an example of the utility of lists, we can compare a Lisp function and a BASIC subroutine, each of which takes as input the name of a person, determines if the person is already known, and if not, adds the name to a Lisp list or BASIC array. The BASIC subroutine is given in Listing B5; a Lisp version is shown in Listing B6.

I will not explain every detail of the Lisp function here, but the comments should be adequate for you to get the idea.

The BASIC subroutine is quite complicated to use. We must set the variable T$ equal to the name and then call the subroutine with a GOSUB 1000 statement. The subroutine must check for an overflow of the array, and the calling program must somehow take care of this possibility. In addition, the routine is rigid: it can only add the variable T$ to the array T1$. The array T1$ itself must be defined and filled with nulls by a DIM statement somewhere else in the program.

In contrast, the Lisp function retains full generality. It will return as its value a list consisting of any atom added if necessary to any list. The value of the statement

(ADJOIN 'APPLE 'FRUITS)

where FRUITS has the value

(PEAR BANANA LION COW)

will be

(APPLE PEAR BANANA LION COW)

The value of

(ADJOIN 'CL 'ELEMENTS)

will be

(FE NA K CL MG)

if ELEMENTS starts out as

(FE NA K CL MG)

while the value of

(ADJOIN TOM FRIENDS)

where FRIENDS is (DICK AND HARRY), would be (TOM DICK AND HARRY).

Lists expand and contract as needed, so there is no need for DIM statements and no need to fix the size ahead of time.

In addition to simple lists, Lisp data may be kept in more complex forms. One of the most simple and common of these is the "association list."

An example of an association list can be seen in Listing A4 accompanying the "Note for users of muLisp-80." An association list is a "list of lists." The function (ASSOC KEY A-LIST) returns the sublist of A-LIST, where KEY is the first element of the sublist.

One of the uses of an association list, as in the example, is to act like an array. Unlike a BASIC-type array, in which the key may only be an integer, the key of an association list may be any atom or list.

The association list in the example also illustrates a basic, and usually hidden, aspect of Lisp—the "dotted pair."

The basic data structure of Lisp is not really the list, but a simpler structure called a "dotted pair" or "CONS cell," which is a form of binary tree. This is best shown by example: the value of

(CONS 'JOHN 'SMITH)

is

(JOHN . SMITH)

The CAR (or left side of the binary tree) is JOHN and the CDR (or right side of the binary tree) is SMITH. The equivalent list form is the value of

(CONS 'JOHN (CONS 'SMITH NIL))

The CAR of this is JOHN and the CDR is (SMITH). Dotted pairs are best ignored by the novice Lisp programmer. I mention them only because, in the case of cursor control for muLisp-80, greater speed and efficiency is obtained by using dotted pairs in place of lists in the association list.

different from those provided in CURSOR.ZEN. CURSOR.LIB also contains many functions to allow muStar to use the special-function keys of the '19 and to let you use the other special features of the terminal. (Users of muLisp-80 should read a note for them accompanying this article.)

The control and special-function keys

muStar can easily be modified to use the Heath/Zenith special-function keys. Each special-function key generates a two- or three-character code, the first of which is an ESC. Since muStar evaluates each character as it is typed in, all we have to do is let it know what to do when an ESC character is encountered. This is done at the end of the file CURSOR.LIB.

Our first problem is that the ESC character is used by muLisp as the keyboard-interrupt character. Unless we make some changes, every time you hit a special-function key, muStar will come to a halt and you will enter the muLisp command mode. Fortunately, we can change the interrupt character to some other character, or turn off this feature entirely.

In muLisp, every character is said to be of one of nine types. For example, the semicolon (;) is the single-line comment delimiter, which is character-type 5. The keyboard-interrupt character is type 8. A character without a special meaning or function is of type 0. Fortunately, muLisp has a CHARTYPE function to change the type of characters.

To make the ESC character a regular character instead of the terminal-break character, we must use the command (CHARTYPE (ASCII 27) 0). Then we set the value of ESC to the name of a function that will be evaluated whenever muStar reads in an ESC. Since we are working with the special-function keys, we can call this function SPECIAL.

From now on, whenever muStar encounters an ESC, the function SPECIAL is called. This function, as seen in Listing 8, gets the next character from the keyboard and checks to see if it has a SPECIAL property on its property list. If it does, the property is evaluated as the name of a function.

So, in order to assign a special-function key to a muStar command, all we have to do is put the name of the command (for instance, UP-LIN to move the cursor up one line) on the property list of the letter generated by the function key after it sends the ESC.

The f4 key of the '19 sends the two-character sequence ESC v. So, to make f4 scroll the text down one line, the command is (PUT 'V 'SPECIAL 'SCR-DWN). (The names, effects, and default control-character assignments of the muStar commands are listed in the muLisp-83 Reference Manual on page 6-11.)

To cover the case of three-character codes, the atom SPECIAL is put on the

Listing 8. This CURSOR.LIB file will get muStar to recognize the Heath/Zenith function and keypad keys for cursor control and basic editing functions.

```
; File:  CURSOR.LIB              11/30/84          Stanley Schwartz

%The functions CLRSCRN, HOME, UPLINE, and BACKSPACE are the minimum
 necessary to modify muSTAR for HEATH/ZENITH computers.  As written
 here, they require the functions ESC, ESCQ, and RPT.  The functions
 SUB1 and MAPC$ are not built into muLISP, but they are already part
 of muSTAR.  The other functions in this file may be omitted.
 Remember that this file must end with a (RDS) command.  To modify
 muSTAR put this file CURSOR.LIB and MUSTAR.LIB on the default drive.
 Load muLISP by typing MULISP after the operating system prompt and
 following the dollar-sign prompt, issue the commands:

         $ (RDS 'MUSTAR 'LIB) (SAVE 'ZENSTAR) RETURN NIL

 This will read in and save muSTAR as a SYS file on the logged
 drive.  Then the muSTAR header message and menu will be displayed,
 indicating that muSTAR is ready to accept commands as described
 in the muLISP Reference Manual. %

(DEFUN CLRSCRN (LAMBDA NIL          ;Clear the screen and home the cursor.
  (ESCQ E) ))

(DEFUN HOME (LAMBDA NIL             ;Move the cursor to the home position.
  (ESCQ H) ))

(DEFUN UPLINE (LAMBDA (NUM)
  ((ZEROP NUM))
  ((NUMBERP NUM)
    (PRIN1 (ASCII 13))              ;Move cursor to leftmost col
    (RPT NUM '(ESCQ A)) )           ;and up NUM lines.
  (UPLINE 1) ))

(DEFUN BACKSPACE (LAMBDA (NUM)      ;Move left NUM spaces.
  ((NUMBERP NUM)
     (RPT NUM '(PRIN1 (ASCII 8))) )
  (BACKSPACE 1) ))

%The following are utility functions needed by the above   %

(DEFUN ESC (LAMBDA CODE             ;Print ESCAPE sequences
  (PRIN1 (ASCII 27))
  (LOOP
     (PRIN1 (POP CODE))
     ((NULL CODE)) ) ))

(DEFUN ESCQ (NLAMBDA (CODE)       ;Print single char ESC sequence
  (PRIN1 (ASCII 27))              ;Do not have to QUOTE
  (PRIN1 CODE) ))

%The function RPT (short for RePeaT) gives us the facility to
 repeat an action a fixed number of times, like in a FOR loop
 in other languages.%

(DEFUN RPT (LAMBDA (NUM EXP)      ;Repeat an expression num times
  ((PLUSP NUM)                    ;If num is a positive number
    (LOOP
      (EVAL EXP)                  ;evaluate the expression EXP
      ((ZEROP (SETQ NUM (SUB1 NUM)))) ) ) )) ;decrement counter, check

(SETQ LINELEN 79)                 ;Screen width.

(SETQ PAGELEN 24)                 ;Screen lines.

(SETQ INDENT 2)                   ;Indentation space.

%The following functions are not required by unmodified muSTAR but
 are useful to control the terminal.  %

% CURSOR[row,col] repositions the cursor to row <row> and column <col>.
The upper left hand corner of the screen is row 0, column 0.  The
maximum value of <row> is 24 and the maximum value of <col> is 79.
Remember to enable the status line if <row>=24.  If CURSOR is called
without arguments, it returns the current cursor row number and does not
move the cursor.  This version is modified from the CURSOR.ZEN file that
comes with muLISP.  This function duplicates the built-in cursor
function which works only on the IBM-PC. %

(DEFUN CURSOR (LAMBDA (ROW COL
    LINELENGTH READCH RDS)
  ((AND (NUMBERP ROW) (NUMBERP COL)
        (LESSP -1 ROW 25) (LESSP -1 COL 80))
    (ESC 'Y (ASCII (PLUS ROW 32)) (ASCII (PLUS COL 32)))
    ROW )
```

→

```
  (ESCQ n)              ;Request cursor position
  (READCH) (READCH)     ;Throw away ESC and "Y"
  (SETQ ROW (READCH))   ;Set ROW to current row
  (READCH)              ;Throw away column
  ((NUMBERP ROW)
    (PLUS ROW 16) )
  (DIFFERENCE (ASCII ROW) 32) ))

%If you use direct cursor addressing the SPACES function may not return
 the correct column number.  In such cases use COL#.%

(DEFUN COL# (LAMBDA (READCH RDS)
  (ESCQ n)              ;Request cursor position
  (READCH)              ;Throw away ESC and "Y"
  (READCH)
  (READCH)              ;Throw away row
  ((NUMBERP (READCH))
    (PLUS RATOM 16) )
  (DIFFERENCE (ASCII RATOM) 32) ))

(DEFUN SAVE-CUR (LAMBDA (SWITCH) ;Save the current cursor position.
  ((NULL SWITCH) (ESCQ k))        ;Restore if called with NIL.
  (ESCQ j) ))

;Functions to use the 25th line of the screen.

(DEFUN SET25 (LAMBDA (SWITCH) ;Enable the 25th line, clear if nil.
  ((NULL SWITCH) (ESC 'y 1))
  (ESC 'x 1) ))

(DEFUN PRINT25 (LAMBDA (MS COL) ;Prints a message in reverse-video
  (SAVE-CUR T)                  ;Save cursor position
  (SET25 T)                     ;Enable status line
  ( ((NAME COL)(SETQ COL Ø)))   ;If Col is not a number, set to Ø
  (CURSOR 24 COL)               ;The 25th line is 24 if you start from Ø
  (REVERSE-VID T)
  (PRTSEN MS)
  (REVERSE-VID) ))

%Other terminal features.%

(DEFUN REVERSE-VID (LAMBDA (SWITCH)  ;Turn reverse video on if T
  ((NULL SWITCH)
    (ESCQ q) )
  (ESCQ p) ))

(DEFUN GRAPHICS (LAMBDA (SWITCH)     ;Enable graphics characters if T
  ((NULL SWITCH)
    (ESCQ G) )
  (ESCQ F) ))

(DEFUN BELL (LAMBDA (NUM)            ;Ring the bell NUM times.
  ((NUMBERP NUM)
    (RPT NUM '(PRIN1 (ASCII 7))) )
  (BELL 1) ))

(DEFUN ALTKEY (LAMBDA (SWITCH)       ;Set alternate keypad mode
  ((NULL SWITCH)
    (ESC 'y 7) )
  (ESC 'x 7) ))

(DEFUN SHIFTKEY (LAMBDA (SWITCH)     ;Set keypad shifted mode
  ((NULL SWITCH)
    (ESC 'y 6) )
  (ESC 'x 6) ))

%Erase parts of the screen%

(DEFUN ERASE (NLAMBDA (SWITCH)
  ((EQ SWITCH 'RIGHT)               %Erase to end of line%
    (ESCQ K) )
  ((EQ SWITCH 'LINE)                %Erase entire line%
    (ESCQ 1) )
  ((EQ SWITCH 'LEFT)                %Erase to begining of line%
    (ESCQ o) )
  ((EQ SWITCH 'TOP)                 %Erase to top of screen%
    (ESCQ b) )
  ((EQ SWITCH 'BOTTOM)              %Erase to bottom of screen%
    (ESCQ J) )
  ((EQ SWITCH '25)                  ;Erase status line
    (SET25) )
  (CLRSCRN) ))                      %Erase everything and home cursor%

%Utility function used by the above.%
```

→

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property list of the "?" character. Three-character ESC sequences are generated by the keys of the numeric keypad in the alternate-keypad mode. These codes begin with an ESC and have a "?" as the second character. So when a "?" follows an ESC, a second call to the function SPECIAL is needed to get the last code generated by the function key.

The codes generated by each key may be found in the manual for your computer. Statements can be added to the EDIT-TXT function of muStar to set and unset the shifted-keypad and alternate-keypad modes. I have included sample key assignments for the Z19 terminal using the top row of function keys and both the straight and shifted keypad keys.

That layout will also work on a '110 or '120. The keyboard of this type of computer is a little bit different from a '19 since there are named function keys and arrow keys in addition to the numeric keypad. These named keys will perform only their straight (unshifted) action. The numeric keypad keys will work the same way as those on an '89 or '19 terminal, even though they do not have the IC, DC, arrow, etc. labels.

In general, it is probably best, at a minimum, to have the function keys do what is written on them. For example, use the IC key to toggle the insert-character mode. The proposed key assignments in CURSOR.LIB follow this principle. Where possible, using a shifted key produces the action of the unshifted key in an intensified form. For example, the left-arrow key moves the cursor left one character, while pressing the left-arrow key and the shift key at the same time moves the cursor left one word.

Unmodified muStar uses control codes for the editing functions. For example, to move the cursor to the end of the line, hold down the CTRL key and "B". It is also possible to change the assignments of the control characters to make muStar more like your favorite editor. These assignments are found at the end of the MUSTAR.LIB source file.

For example, 2 is the ASCII code for the character generated by the terminal when you hold down the CTRL and B keys at the same time. Therefore, to make CTRL-B move the cursor backward a space rather than to the end of the line, include (SET (ASCII 2) 'LFT-CHAR). The muStar function that does this cursor movement operation is LFT-CHAR.

Deeper into muStar

The functions in CURSOR.LIB are all that is needed to get muStar to recognize the special-function keys. Now that we have CURSOR.LIB in Listing 8 with its library of useful terminal-control functions, we can use them to further customize muStar for the '19, '89, and '100. This is done in the file MUALTER.LIB (Listing 9). (You may not be able to understand the modifications until you gain some ex-

```
(DEFUN PRTSEN (LAMBDA (LST NUM)   %Print a list without parenthesis%
  ( ((ATOM LST)(PRIN1 LST))
    (MAPC$ LST '(LAMBDA (ATM) (PRIN1 ATM) (SPACES 1))) )
  ((NULL NUM))
  (TERPRI NUM) ))                 %and skip NUM lines%

;******************** SPECIAL FUNCTION KEYS ******************

(CHARTYPE (ASCII 27) 0)     ;Make ESC a regular character
(CHARTYPE '"~" 8)           ;Make the "~" the break character

(DEFUN SPECIAL (LAMBDA (FUN$)
  ((SETQ FUN$ (GET (READCH) 'SPECIAL))
    (APPLY FUN$ (LIST *INSERT*)) ) ))

(SET (ASCII 27) 'SPECIAL) ;Instead of ASCII 275 on IBM-PC.

(MAPC$ '(%    Keypad is in alt-shift mode

                Unshifted keypad keys

  key           code/function           purpose
   0
  1/IL        % (L INS-LIN)%            Insert a blank line
  2/dwn       % (B DWN-LIN)%            Move cursor down one line
  3/DL        % (M DEL-LIN)%            Delete current line
  4/<-        % (D LFT-CHR)%            Move cursor left one character
  5/HOME      % (H MOV-LFT-END)%        Move to begining of current line
  6/->        % (C RHT-CHR)%            Move cursor right one character
  7/IC        % (@ INS-TOG)(0 INS-TOG)% Toggle insert mode
  8/^         % (A UP-LIN)%             Move cursor up one line
  9/DC        % (N DEL-RHT-CHR)%        Delete current character
   .
  ENTER          RETURN

                  Shifted keypad keys   %(? SPECIAL)%

  key           code/function           purpose

   0          % (p SRC-TOK)%            Find a name
  1/IL        % (q GET-LIN)%            Insert previously deleted line
  2/dwn       % (r DWN-PAG)%            Scroll text up a screenful
  3/DL        % (s GET-LIN)%
  4/<-        % (t LFT-TOK)%            Move cursor left one word
  5/HOME      % (u MOV-RHT-END)%        Move to end of current line
  6/->        % (v RHT-TOK)%            Move cursor right one word
  7/IC        % (@ INS-TOG)%            Toggle insert mode
  8/^         % (x UP-PAG)%             Scroll text up a screenful
  9/DC        % (y DEL-RHT-TOK)%        Delete word to right of cursor
   .          % (n RPT-SRC)%            Repeat last search command
  ENTER                                 Delete current line

                  Other function keys

   BLUE (F6)  % (P ESC-CHR)%            Enter special char as name
   RED  (F7)  % (Q SCR-DWN)%            Scroll text down one line
   GREY (F8)  % (R SCR-UP) %            Scroll text up one line%

  )'(LAMBDA (LST$) (PUT (CAR LST$) 'SPECIAL (CADR LST$)) ) )

;******************  TIME AND DATE FUNCTIONS ************************

(DEFUN TIMETEST (NLAMBDA (FUN COUNT)  ;To test efficency
  (SETQ COUNT 100)                    ;returns the time in .01 secs to
  (RECLAIM)                           ;do 100 iterations of FUN
  (TIME 0)                            ;Call like (TIMETEST (ERASE 'END))
  (LOOP
    ((ZEROP COUNT)
      (DIFFERENCE (TIME) 12) )        ;change number for speed of your system
    (APPLY (CAR FUN) (CDR FUN))       ;is 39 for H-89 muLISP-80 and 12
    (SETQ COUNT (SUB1 COUNT)) ) ))    ;for ZDOS muLISP-83. To find number
                                      ;use 0 and (TIMETEST (NULL NIL))

;The functions SET-SYSCALL, GET-SYSCALL, DATE and CLOCK are for ZDOS only.

;Returns time as (hr min). Set time by calling (CLOCK 13 23) for 1:23pm
(DEFUN CLOCK (LAMBDA (HR MIN)
  ((NULL HR)
    (SETQ HR (GET-SYSCALL 11264))
    (LIST (CAADR HR) (CDADR HR)) )
  (SET-SYSCALL 11520 0 0 HR MIN)
  (CLOCK) ))

;Returns date as (mm dd yyyy). Set date by calling (DATE 11 7 1984) for
;  November 7, 1984
(DEFUN DATE (LAMBDA (MON DAY YR)
```

→

```
  ((NULL MON)
    (SETQ MON (GET-SYSCALL 10752))
    (LIST (CAAR MON) (CDAR MON) (PLUS (TIMES 256 (CAADR MON)) (CDADR MON))) )
  (SET-SYSCALL 11008 MON DAY YR)
  (DATE) ))

;The following are utilities used by DATE and CLOCK.  If the date or time
;set was unsucessful, SET-SYSCALL returns NIL.
(DEFUN SET-SYSCALL (LAMBDA (CODE DH DL CH CL)
  (REGISTER 0 CODE)
  (REGISTER 3 (PLUS (TIMES DH 256) DL))
  (REGISTER 2 (COND
      ((NULL CL) CH)
      (T (PLUS (TIMES CH 256) CL)) ))
  (INTERRUPT 33)
  ((ZEROP (REMAINDER (REGISTER 0) 256)))
  NIL ))

(DEFUN GET-SYSCALL (LAMBDA (CODE)
  (REGISTER 0 CODE)
  (INTERRUPT 33)
  (LIST (DIVIDE (REGISTER 3) 256) (DIVIDE (REGISTER 2) 256)) ))

;This function allows you to use any operating system command from
;within muLISP.  For MS/DOS 2 only.  Example (DOS '"ERASE *.BAK")
;to erase all "BAK" files on the default disk. COMMAND.COM is assumed
;to be on disk A.

(DEFUN DOS (LAMBDA (STRING)
  (EXECUTE "A:COMMAND.COM" (PACK (LIST '"/C " STRING))) ))

%This is a TIME clock function for the H-89 and CP/M. It duplicates
 the built-in ZDOS function but can only time for two min. %

(DEFUN TIME (LAMBDA (FLG)
  ((NULL FLG)
    (QUOTIENT (PLUS (MEMORY 11)(TIMES 256 (MEMORY 12))) 5) )
  (MEMORY 12 0)    ;If FLG true, reset clock to 0
  (MEMORY 11 0)
  0 ))

;****** Insert MUALTER.LIB here if you want added performance.

(SETQ SAVE T) ;Turn on muSTAR SAVE flag

(RDS)
```

perience with muLisp, but they will work.)

Some of the changes we will make with MUALTER.LIB are worth using for smoother operation. For instance, most of my changes to muStar are to avoid the unnecessary and distracting repainting of the screen in some situations where a scroll is better. Some of the changes take advantage of the extra (status) line on the '19. A more substantial rewrite of muStar could be done, but in general I have only changed things that make a significant improvement.

MUALTER.LIB contains modified versions of various muStar functions. The originals are copyrighted by the Soft Warehouse and parts of them are printed here by their permission. My modifications are commented, and comparison with the unmodified versions from the file MUSTAR.LIB on the muLisp distribution disk should clarify their operation.

muLisp files

In order to set up our new version of muStar, we must know something about how muLisp uses disk files. The muLisp language uses two types of files. One type is ASCII files, which may be set up so that records may be accessed either in sequential order or starting at any byte of the file (random order). These files are used to store data and function definitions and are similar to files used by other languages.

A second type is a special kind of binary file called a "SYS file" because the file name has an extension of .SYS. This file contains a compressed memory image of the muLisp environment that existed when the file was created by using the muLisp SAVE command.

A SYS file with its environment is restored by the LOAD command or by invoking muLisp from the operating system command line followed by the name of the file. As noted above, to start up muStar, type MULISP MUSTAR from the operating system's A) prompt, or type (LOAD MUSTAR) from the muLisp "$" prompt.

When a SYS file is LOADed, the complete muLisp environment that existed when it was created is restored, including all function definitions, variable bindings, and property values. The environment that existed at the time that you gave the LOAD command is destroyed. You can LOAD a muLisp SYS file into a computer with less memory than the one on which the file was SAVEd, as long as

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there is enough memory for the program and data.

A SYS file is usually created when a program has been completely debugged. Loading a SYS file is very fast, while reading in the equivalent source file may take much longer. A SYS file can also be used to suspend a program temporarily without losing intermediate results, or to save a large amount of data in a small disk file. In some ways, this facility is like Benton Harbor BASIC's FREEZE command, but it may be used as a general method of saving programs and data.

Build the new muStar

Now we are ready to set up the new version of muStar. To do this, we need the file MUSTAR.LIB from the distribution disk, and the file CURSOR.LIB from Listing 1. CURSOR.LIB contains the special code needed to adapt muStar for your terminal. When MUSTAR.LIB is first read into your computer, it will automatically look for a file named CURSOR.LIB on the default disk.

First, using an external editor on a new disk, create the file CURSOR.LIB, leaving out those parts that are not appropriate to your computer. (For example, the TIME function if you are using Z-DOS.)

If you want to have the optional extra performance enhancements, you may append the functions found in MUALTER.LIB to the end of CURSOR.LIB. Alternatively, you may directly change a copy of MUSTAR.LIB with a text editor, using MUALTER.LIB as a guide. Note that the (RDS) command should be the last statement in the total file, so if you include the MUALTER functions in CURSOR.LIB, put them before the (RDS).

Copy MUSTAR.LIB and MULISP.COM to your disk. Assuming that MULISP.COM, MUSTAR.LIB, and CURSOR.LIB are all on the default drive, type MULISP to enter muLisp. When you see the "$" prompt, type:

```
(RDS 'MUSTAR 'LIB) (SAVE 'ZENSTAR)
    RETURN NIL
```

The muStar source code and your modifications will be read in, and the new version of muStar will be saved on the disk as ZENSTAR.SYS, ready to be invoked from the operating system prompt by the command MULISP ZENSTAR. You may now delete MUSTAR.LIB and CURSOR.LIB from your working disk.

If you already have a MUSTAR.SYS set up, another way to make the changes is to read in CURSOR.LIB with the "R" for READ option from the muStar menu. This will automatically alter your muStar, and you may save the new version by issuing a SAVE command from the "E" option from the main muStar menu.

Further reading

I hope that this article will be useful to other Heath/Zenith users who are interested in muLisp and in the Lisp language in general. For readers who are unfamil-

Listing 9. MUALTER.LIB lets muStar use Heath/Zenith terminal features (such as the 25th line) in addition to those provided by CURSOR.LIB (Listing 8).

```
; File:  MUALTER.LIB              11/30/84         Stanley Schwartz

% * * * * * * * muSTAR Modification Package * * * * * * * * *

  The following functions modify muSTAR to take advantage of some of
  the special features of Heath/Zenith terminals. These modifications
  require the basic functions to control the terminal found in the
  file CURSOR.LIB (listing 1).  The functions in this listing are
  modified versions of those in MUSTAR.LIB from the muLISP distribution
  disk.  muSTAR is copyrighted by the Soft Warehouse, and portions are
  quoted here by permission.%

%  The function DEL-LIN deletes a line of text and places it in a
   save buffer.  The modified version has improved scrolling of the
   text.  This function was called CTRL-Y in earlier versions of
   muSTAR. %

(DEFUN DEL-LIN (LAMBDA NIL
  (SPL-TOK *COL*)
  (SETQ *DELETED* (CADR *ROW*))
  (ESCQ M)                          ;Delete line from screen
  ((NULL (CDDR *ROW*))              ;Is this the last line of text?
    (SETQ *COL* (CONS Ø))
    (RPLACA (CDR *ROW*) *COL*) )
  ((AND (NULL *POST-TEXT*) *PRE-TEXT*) ;Some text to add to top of screen?
    (RPLACD *TEXT* (CONS (POP *PRE-TEXT*) (CDR *TEXT*)))
    (RPLACD *ROW* (CDDR *ROW*))
    (SETQ *COL* (CADR *ROW*))
    (HOME)                          ;Home cursor
    (ESCQ L)                        ;Roll down screen
    (PRT-ROW (CADR *TEXT*))         ;Insert line at top of screen
    (MOVE-CUR *TEXT* *ROW* *COL*) );Return cursor to place
  ( ((NULL *POST-TEXT*))
    (CURSOR (DIFFERENCE PAGELEN 2) Ø)  ;Called PAG-LEN$ in early ver.
    (PRT-ROW (CAR *POST-TEXT*))
    (NCONC *TEXT* (CONS (POP *POST-TEXT*))) )
  (RPLACD *ROW* (CDDR *ROW*))
  (SETQ *COL* (CADR *ROW*))
  (MOVE-CUR *TEXT* *ROW* *COL*) ))

% The function DEL-RHT-CHR deletes the character at the cursor.
  called CTRL-G in old versions.%

(DEFUN DEL-RHT-CHR (LAMBDA NIL
  ((NULL (DEL-CHR)))
  (ESCQ N) ))           ;Delete character

%  The function INS-LIN inserts a blank line into the text when
   needed.  It was called CTRL-N in earlier versions.%

(DEFUN INS-LIN (LAMBDA NIL
  ( ((NULL (CDR *COL*)))
    ((ATOM (CADR *COL*)))
    (RPLACA (CDR *COL*) (PACK$ (CADR *COL*))) )
  (RPLACD (CDR *ROW*) (CONS (CONS Ø (CDR *COL*)) (CDDR *ROW*)))
  (RPLACD *COL* NIL)
  (RPLACA (CADDR *ROW*) (IND-NXT (CADR *ROW*)))
  (ERASE RIGHT)             ;erase text that is moved to new line
  (TERPRI)                  ;go down one line
  (ESCQ L)                  ;insert a new blank line
  (PRT-ROW (CADDR *ROW*))   ;reprint line
  ( ((GREATERP (LENGTH *TEXT*) PAGELEN)  ;called PAG-LEN$ in old ver.
      (PUSH (CHOP$ *TEXT*) *POST-TEXT*) ) )
  (MOVE-CUR *TEXT* *ROW* *COL*) ))

%  The function SCR-DWN, called CTRL-W in old versions, scrolls down
   the whole screen%

(DEFUN SCR-DWN (LAMBDA NIL
  ((NULL *PRE-TEXT*))     ;if no text above the screen, quit
  ( ((NULL (CDDR *ROW*))
      (UP-LIN) ) )        ;called CTRL-E in old versions
  (RPLACD *TEXT* (CONS (POP *PRE-TEXT*) (CDR *TEXT*)))
  (PUSH (CHOP$ *TEXT*) *POST-TEXT*)
  ( ((NULL (CAR *ROW*))
      (POP *ROW*) ) )
  (HOME)                  ;insert the new line at the
  (ESCQ L)                ;top of the screen
  (PRT-ROW (CADR *TEXT*)) ;insert new text
  (MOVE-CUR *TEXT* *ROW* *COL*) ))

% The function SCR-TOK asks for the name of a token and moves
   the cursor to it.  This version uses the 25th line.%

                                                              →
```

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iar with Lisp, two books are very helpful. These are *Lisp*, by Patrick Henry Winston and Berthold Klaus Paul Horn, Addison-Wesley, 1981; and *The Little Lisper* by Daniel P. Friedman, Science Research Associates, Inc., 1974.

The Winston and Horn book is a complete introduction to Lisp and its applications and it has become the standard text. The first edition uses the MacLisp dialect; however, most of the examples are easily worked in muLisp or Lisp/80. It is a college-level text, but it is written in a simple style and can be used by those with little previous computer knowledge. Solutions to all of the many sample problems are found at the back of the book. This makes this book ideal for self-study.

The Winston and Horn book is now out in the second edition. The new edition uses the Common Lisp dialect instead of MacLisp. The first edition is better for users of muLisp or Lisp/80.

The Friedman book is an amusing treatment of the important topic of recursion in Lisp; it uses the programmed-instruction format. Recursion is the very heart of Lisp and must be understood intuitively. For this I found *The Little Lisper* to be vital. The programmed-instruction format gives necessary drill. This book assumes no knowledge of Lisp or of computers.

(I have not gone into recursion in the main body of this article because it is not important in this project of customizing muStar. It is covered a bit, however, in the comments accompanying this article, "Some More Lisp Basics." Recursive functions are very useful in list processing, searching, etc.)

A very pleasant introduction to Lisp can be found in the articles by Douglas R. Hofstadter which appeared in the February, March, and April 1983 issues of *Scientific American*. Be warned, however, that these articles are aimed at habitual readers of the *Scientific American* math column.

Two other books published more recently may be of interest. One is *Common Lisp: The Language* by Guy Steele, Digital Press, 1984. This is the specification for the new Common Lisp standard. While not particularly relevant for microcomputer users, it shows how far Lisp can be extended.

A very interesting textbook is *Structure and Interpretation of Computer Programs* by Harold Abelson, Gerald Jay Sussman, and Julie Sussman; MIT Press, 1985. This is an introductory computer science text from MIT for computer science and electrical engineering majors. Unlike most such books, this one uses Lisp. And unlike most Lisp books, this book does not have an artificial-intelligence emphasis. Solutions to the

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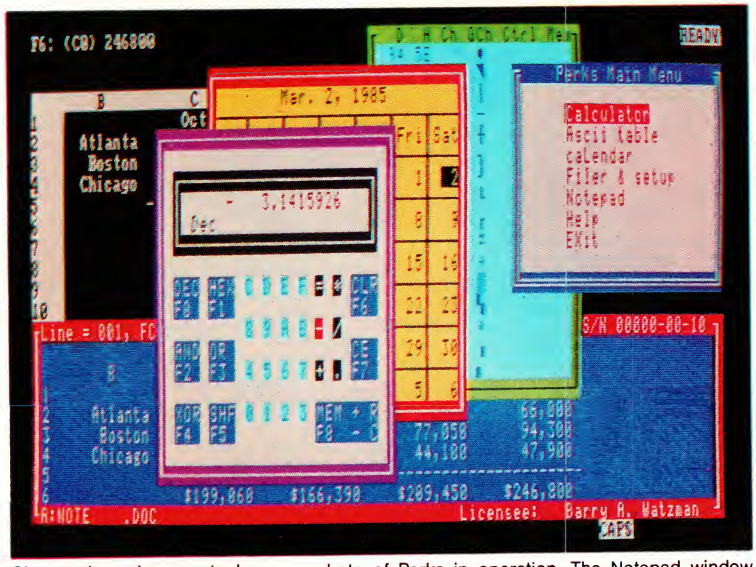

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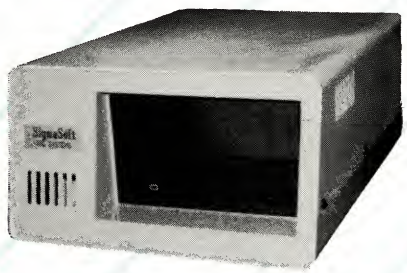

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```
(DEFUN SRC-TOK (LAMBDA (READCH)
  (PRINT25 '"FIND NAME?  ")
  (SETQ READCH T)
  (SETQ *STRING* (CAR (READLINE)))
  (SAVE-CUR)
  (SET25)
  ( ((NONNULL *INSERT*)(PRINT25 '*INSERT* 7Ø)(SAVE-CUR)) )
  (RPT-SRC) ))

% Toggle the insert character mode.  If in insert mode, indicate
  on the 25th line.%

(DEFUN INS-TOG (LAMBDA NIL ;Insert toggle. Print on status line.
  (SETQ *INSERT* (NOT *INSERT*))
  ((NULL *INSERT*)(SET25))
  (PRINT25 '*INSERT* 7Ø)
  (SAVE-CUR) ))

; The main function of muSTAR

(DEFUN DRIVER (LAMBDA NIL
  (RDS)
  (SETQ WRS)
  (SETQ ECHO)
  (SETQ PRIN1 T)
  (SETQ READCH T)
  (CLRSCRN)
  (TERPRI 6)
  (SPACES (QUOTIENT (DIFFERENCE LINELEN 32) 2))
  (PRINT '"*** muSTAR AIDS, Version 2.2 ***")
  (SPACES (QUOTIENT (DIFFERENCE LINELEN 41) 2))
  (PRINT '"modified for the H-89 by S Schwartz M.D.")
  (RECLAIM)
  (RECLAIM)
  (LOOP
    (SET25)                    ;restore terminal configuration
    (ALTKEY)
    (SHIFTKEY)
    (LINELENGTH (ADD1 LINELEN))
    (APPLY (GET (MENU$ MENU$) 'EXECUTIVE)) ) ))

% The only modifications to EDIT-TXT are the insertion of commands
 ALTKEY and SHIFTKEY to set up the keypad special function keys
 so the body of the function is omitted to save space here.

(DEFUN EDIT-TXT (LAMBDA (*TEXT*
    *PRE-TEXT* *POST-TEXT* *ROW* *COL* *INSERT* *STRING* CHAR$ READCH)
  (ALTKEY T)                        ;Set alternate keypad mode
  (SHIFTKEY T)                      ;Set keypad shifted mode
  (SETQ *PRE-TEXT*)
  (SETQ *POST-TEXT* (SPLIT$ *TEXT* PAGELEN))
  (LOOP

   The main part of the function goes here.  You do not have to
   resume the normal keypad mode in EDIT-TXT because it is done
   in DRIVER.%

%Delete the functions ROLL-UP-ROW, etc because they are no longer
 needed.  Their purposes are accomplished by simple code in the
 calling functions using our H/Z special functions. The following
 statement deletes the functions, or do it by editing MUSTAR.LIB %

(MAPC$ '(ROLL-UP-ROW ROLL-DWN-ROW REPL-ROW ROW-PRT-LEN)
   '(LAMBDA (FUN) (MOVD 'NIL FUN)) )

(SETQ SAVE T)                       ;Turn on muSTAR SAVE flag.
(RDS)
```

problems are not provided, and this book is much more difficult for self-study than the Winston and Horn book.

Ordering Information

muLisp-83 (CP/M, 8" SS/SD), $200 + $8 shipping (prepaid), or $220 + $8 shipping.
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Bellevue, WA 98004
800/426-9400, 206/828-8088 (in Washington or Alaska)

Lisp/80 (CP/M and MS-DOS), $39.95 + $2 shipping.
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Letter Quality, Dot Matrix: the MT-160L Printer

Mannesman Tally's MT-160L gives you the best of both worlds.

Michael Ho

BZZZZZZZZZZZZ. BZZZZZZZZZZZ. My eyes would be glued to the printhead of my H14 as I watched and waited for a printout.

In 1980, there were basically three types of printers available from Heath: the Heathkit H14 dot-matrix at about $600, the Texas Instruments dot-matrix at $1,700 or so, and the Diablo daisy-wheel which could cost as much as $2,500. Right after I purchased my H89 computer, the only printer in my budget was the H14.

Three years elapsed with lots of noise and problems, and I finally decided it was time to get a new printer.

I am a high-school student who writes occasional term papers, so I wanted to be able to use my printer with word processing. At the same time, I wanted speed for program listings and dot-addressable graphics. And I was looking for a small, eighty-column model for my limited desk space.

I began searching for a good dot-matrix printer because I had read that the print quality of dot-matrix printers was approaching that of daisywheel output. Leafing through an issue of *Byte* magazine, the ad from a company called Mannesmann Tally caught my eye.

Mannesmann Tally? I had never heard of them before. Well, according to their ad, their MT-160L dot-matrix printer had received good reviews, and had three printing modes: draft, word processing, and graphics. All of this sounded like heaven compared to my H14, so I looked into it. After receiving a print sample and calling up some mail-order houses to check on prices and features, I was sold.

I should point out that I, like many others, bought the printer without examining an actual model. Of course, this is a bit risky. But considering the sample printout in comparison with my H14, it was a risk I was willing to take. I was more than happy to see the United Parcel Service truck pull up, and I eagerly opened up the box.

Photo courtesy of Mannesmann Tally

Michael Ho is a senior at Orange High School in California. He plans to pursue a career in computer science or engineering.

Outside and in

The Mannesmann Tally MT-160L printer measures a small 13.7″ wide by 9.64″ deep by 6.2″ high and weighs only 17 pounds. Its color is gray and comes very close to the color of the '89. A clear, removable dust cover is also included. The MT-160L has a front control panel with six touch-sensitive buttons and three indicator lights, which I will describe a little later.

The MT-160L has a bidirectional nine-pin printhead and uses a cartridge-type ribbon. The printhead can be removed for cleaning. The ribbon cartridge extends the full length of the printing path and has a plastic guide that attaches to the printhead.

Near the air vents at the front, there is an internal fan; it operates only when the printhead is in motion.

The platen (or roller) measures 10″ across. Right above it is the tear bar, which is spring-hinged and permits tearing of paper one inch from printing. Put down against the paper, the tear bar activates the friction feed; it is flipped up when friction feed is not used.

Single sheets can be used with the friction feed; fanfold or roll paper can be used with the adjustable tractor-feed assembly. The tractor-feed assembly is included with the printer and attaches to the back. Roll paper, though, requires the additional purchase of the roll-holder assembly.

On the right side, there are knobs to adjust for paper thickness and to advance paper. The paper advance is similar to typewriters in that you must press the knob in and turn it to advance the paper between lines. Paper is fed into the printer from the back.

Controlling the printer

The keypad on the front of the printer has three indicator lights and six buttons.

The lights signal whether the power is on, whether the printer is on-line, and whether there is a problem (when the printer is out of paper or the printhead jams).

The six buttons are labelled: On/Off Line, Test, LF (Line Feed), FF (Form Feed), Yes, and No. On/Off Line simply tells your computer whether the printer is ready to receive data; it can therefore be used to interrupt printing (adjust paper, etc.). If the line-feed button is pressed, the paper advances a line; if the button is held down, the paper is advanced at an increased rate. The form-feed button advances the paper a whole page according to the form length set.

Depressing the test button results in a test pattern of ASCII characters sliding across the page. Pressing the test button more than once prints graphics at different densities.

The Yes and No keys are used to set up the printer. If you press the No button alone, the MT-160L will print out the current settings. This listing will show such things as form length, lines per inch, characters per inch, and type of interface.

How do you change these settings? Simply press the Yes and No buttons simultaneously and the MT-160L starts to print out questions! (See Table 1.) Then the Yes and No buttons come into use once again. By answering the yes-or-no questions generated by the printer, you can set everything typically set by a DIP switch on other printers. All settings will remain in the printer's memory until you change them. You can turn off the machine, unplug it, and move it, and the settings will remain.

Built for speed

In the draft mode, the MT-160L has five different character densities: 10 characters per inch, 12 c.p.i., 16.5 c.p.i., and 20 c.p.i. Upper- and lowercase characters are printed using a 7 x 9 matrix at 160 characters per second. The printhead moves bidirectionally; in this mode, it is logic-seeking, so it chooses the most efficient direction to print each line. Double-width, emphasized, and underlined characters can be printed using special printer codes.

I personally didn't like the draft font of the MT-160L. The characters are not crisp or sharp. This might have been necessary in order to make the high speed possible. Nonetheless, whenever I show a draft printout to friends, they always comment that it "looks funny."

This may seem unimportant, since it is just draft copy. But only the draft font can be put into double width. With draft font, an expanded letter "M" looks more like McDonald's Golden Arches than a letter. (See Figure 1.)

One good thing that Mannesmann Tally did was to provide a 20-c.p.i. draft font. This means that you can get a line of 160 characters on normal 8½" x 11" paper. Amazingly, the characters are very readable at this density.

Quality in letters

The MT-160L also has a correspondence mode for nearly letter-quality characters. A modified sans-serif font is achieved through dual-pass printing. The printhead starts from the left side, prints the line, returns to the left to realign itself, moves down a distance of half a dot, and prints the line again. In each pass, the characters are not complete, but instead consist of dot patterns which overlap to form great 20- x 18-dot matrix characters. (See Figure 2.)

The correspondence-mode characters can be printed at 10 c.p.i. for Pica, 12 c.p.i. for Elite, or proportionally spaced. Actually, the only difference between 10 and 12 c.p.i. is the space between characters.

The print speed for correspondence mode is about 40 characters per second. In the correspondence mode, underlining and emphasizing can also be accomplished, in addition to automatic right justification (straight right margin) and automatic centering.

I use this mode quite often with my

```
RESTORE DEFAULTS ?                NO
CHANGE FORM LENGTH ?              YES
     3.5 INCH ?                   NO
     5.5 INCH ?                   NO
     6 INCH ?                     NO
     8 INCH ?                     NO
     8.5 INCH ?                   NO
     11 INCH ?                    YES
CHANGE PRINT FORMAT ?             YES
     CHANGE LPI ?                 YES
          6 LPI ?                 YES
     CHANGE CPI ?                 YES
          10 ?                    YES
     CR IMPLIES LF ?              NO
     LF AT FULL LINE ?            YES
     FOFC ?                       YES
     LF IMPLIES CR ?              YES
CHANGE CHAR SET ?                 YES
     USA ?                        YES
SLASH ZERO ?                      NO
CHANGE AUX CODE SET ?             YES
     NONE ?                       NO
     E CODES ?                    YES
CHANGE COMM CONFIG ?              YES
     CHANGE BUFFER SIZE ?         YES
          MAX ?                   YES
     PARALLEL ?                   NO
     SERIAL ?                     YES
     CHANGE BAUD ?                YES
          9600 ?                  YES
     CHANGE NO. DATA BITS ?       YES
          7 ?                     NO
          8 ?                     YES
     CHANGE NO. STOP BITS ?       YES
          1 ?                     YES
     CHANGE PARITY ?              YES
          NONE ?                  YES
     CHANGE BUSY ?                YES
          LOW ?                   YES
     CHANGE COMM PROTOCOL ?       YES
          NONE ?                  YES
END OF MENU
```

Table 1. The MT-160L printer will prompt you for the settings usually controlled by DIP switches on other printers. The prompts are shown here with the author's settings as responses.

computer. I've been able to do a lot of word processing ever since I bought my printer. Letters, term papers, and even some program listings have been printed in the correspondence mode.

Daisy to dot and back

You can switch between draft and correspondence modes a number of ways. You can specify the desired mode by using the Yes/No programming mode or by including a printer code in your text. And you can go from draft to correspondence by pressing the Yes and FF buttons at the same time.

If you are printing something and you suddenly decide it doesn't need to look nice, you can put the printer off-line and press the Yes and LF buttons, thus returning to the draft mode. Your printout will be part correspondence quality and part draft quality.

Graphing

The graphics mode permits you to print dot-addressable graphics. Graphics are printed unidirectionally (from left to right) in columns eight dots wide. There are four horizontal graphic densities of 50, 67, 100, and 133 dots per inch. Vertically, there are only 64 dots per inch. But since you can shift the printhead to print graphics half a dot lower, it's possible to get 128 dots per inch.

An interesting feature is called Reverse Field. When you send the appropriate code to the printer, the dot patterns that follow will be reversed.

Hooking it up to your computer

The printer is capable of using either the standard RS232C serial or the Centronics parallel interface; it comes with two female connectors built-in at the rear of the unit. Two kilobytes of

DRAFT MODE PRINTING

normal

10 characters per inch.

12 characters per inch.

16.7 characters per inch.

20 characters per inch.

double width

5 characters per inch.

6 characters per inch.

8.3 characters per inch.

10 characters per inch (emphasized, one pass).

A double width letter "M" looks like McDonald's golden arches.

Superscripts and subscripts are printed like a daisy wheel.

CORRESPONDENCE MODE PRINTING

The Mannesmann Tally MT-160L printer can print near-letter quality characters in two passes of the printhead at 10 characters per inch (Pica).

The MT-160L can also print characters at 12 characters per inch (Elite) and proportional spaced characters.

The auto-justification inserts spaces in between words to create a smooth right margin.

Figure 1. The MT-160L offers a wider variety of character densities in draft mode than in correspondence mode.

The quick brown fox jumps over the lazy dog.

The quick brown fox jumps over the lazy dog.

The quick brown fox jumps over the lazy dog.

Figure 2. Correspondence-quality printing is achieved through dual-pass printing. The printhead moves half a dot down before printing the line the second time. The passes shown here separately on the top two lines combine to form the single line shown below them.

random-access memory is built into the printer to provide a text buffer. Interfacing and buffering options can be selected in the Yes/No programming menu.

If you're like me, you'll be hooking up the printer to your H/Z89 (or H8) computer under the Heath Disk Operating System (HDOS). So you're going to need software known as a device driver. There are a number of these on the market, but none that I've seen have been specific to the MT-160L.

Myself, I am using Lindley Systems' Ultimate Driver for the Epson MX-80 with my H89's serial interface. I had to jumper pin 4 on the computer to pin 11 on the printer. I also had to set the BUSY signal on the printer to HIGH. But on the driver menu on the computer, I set BUSY for a LOW signal.

Yes, if the printer is set for a HIGH signal, the computer must check for a LOW. It doesn't make sense, but it works. I think this holds true for all Mannesmann Tally products: *Creative Computing* ran into similar problems with the serial input/output of Tally's Pixy 3 plotter.

There are other device drivers, such as SoftShop's UD.DVD, which may not require special wiring. I haven't tested that driver myself, but it appears that it might be compatible.

For those of you with Z100s running under the Zenith Disk Operating System (Z-DOS), ZDRAFT from ETTS comes preconfigured for the Mannesmann Tally and Epson-compatible printers.

There aren't to my knowledge any CP/M programs designed specifically to support the Mannesman Tally. SoftShop, though, offers UD.COM for printer support under CP/M, and its operation is comparable to UD.DVD. (It was reviewed in *Sextant* #17, July-August 1985. See "A Versatile Printer Driver for CP/M," by Daniel N. Jerome.)

If you are using a serial interface, you might want to check with the company that makes the device driver to see what pins it uses.

The parallel interface uses standard Centronics pin designations and should work with any Centronics interface. (It worked successfully with an Apple computer.)

The manual

The unindexed operation manual is excellent; it is 32 pages long, including appendices. The manual fully explains setting up, functions, operation, and how to do dot-addressable graphics. On one of the first pages it even gives "a quick set-up-and-go routine" so you can see your printer "in action" before studying all its features.

There are four appendices, with interfacing information and the "parameters menu." The parameters menu contains a summary of all of the possible functions with their corresponding printer codes. It is particularly helpful since every code is easy to find and use. Each printer function is described, and the proper code format is given along with a sample in BASIC.

Epson or daisywheel?

The MT-160L has an auxiliary code option which allows the printer to accept certain Epson and daisywheel codes. This does not mean the printer can accept all Epson and daisywheel codes, since the MT-160L does not have all of the corresponding functions. For instance, the MT-160L does not have an italic font; therefore, the Epson code to turn it on would be meaningless. The printer accepts its own ANSI codes regardless of whether you pick Epson or daisywheel as your auxiliary code.

One thing that bothered me was that the printer couldn't totally emulate the Epson printers, which have set somewhat of a standard. Besides the absence of italics, the MT-160L has no truly variable line spacing. There's only a choice of six or eight lines per inch. The variable line spacing may be necessary for some software, such as Lindley Systems' User Programmable Character Driver.

Emphasizing characters is also done differently. The MT-160L just does a double strike of characters, whereas the Epson shifts over a dot before the second strike to give a boldface appearance.

Even when the printer is in the draft

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mode, superscripts and subscripts on the MT-160L are printed as they would be on a daisywheel: a full-sized character half a line up or down. It takes two passes to print a line with these characters. It would have been faster if they had programmed a smaller character set that could be printed in the same pass as the rest of the line.

(It probably sounds as if I should have bought an Epson or Epson-compatible. But Mannesmann Tally never said that their printer was Epson-compatible, so I shouldn't expect it to be.)

A great small printer

The Mannesmann Tally MT-160L is a great small printer for the home or office. It doesn't use any special hardware, depending instead on built-in software. Therefore, improvements could be made in the near future, since most features can be reprogrammed.

I hope that Mannesmann Tally will come out with a set of integrated circuits to change some of the printer functions, perhaps adding some different typefaces.

If you're looking for a dot-matrix printer with near letter-quality output, the MT-160L may be the one you're looking for.

If you write to Mannesmann Tally, they will send you the address of a dealer near you, in addition to some brochures about their products.

There are also a number of mail-order houses which sell MT-160Ls at discounted prices. The list price for the MT-160L is $798, but you can get one by mail ordering for about $600. That's about the price of a low-cost daisywheel printer. And you get a high-speed, graphics-capable dot-matrix printer included at no extra charge!

Ordering Information

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8301 South 180th Street
Kent, WA 98032
800/447-4700, 800/322-4400 (in Illinois)

ZDRAFT (H/Z100, Z-DOS or MS-DOS 2), $129; demo disk and manual, $25.
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206/226-3916

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617/275-6821 evening and weekends

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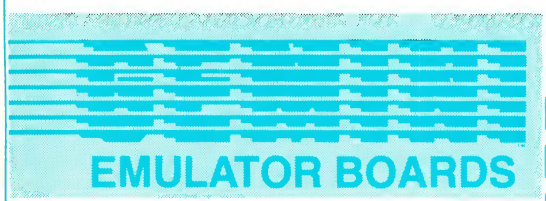

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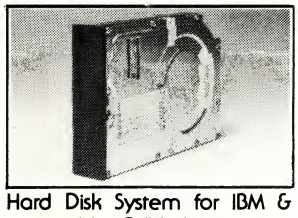

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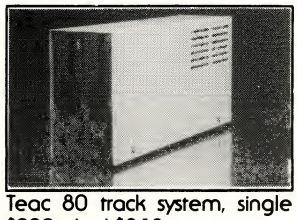

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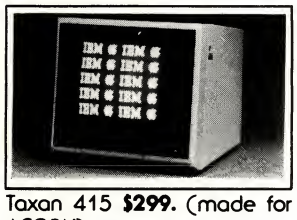

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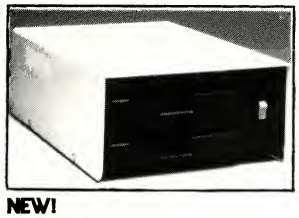

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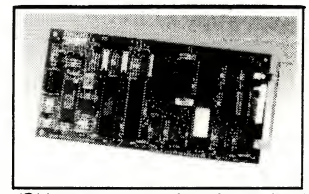

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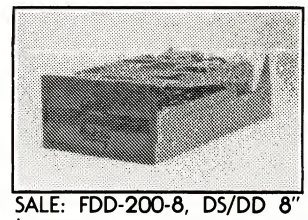

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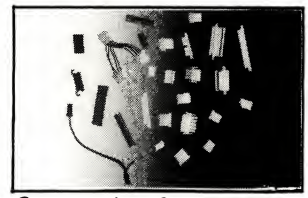

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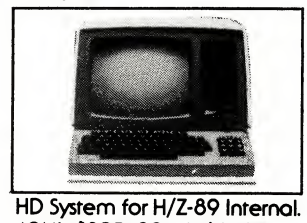

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The EPROM Programmer allows a user to load data stored in its RAM into an EPROM and then verify the transfer. Data can also be loaded from an existing EPROM into the Programmer's RAM memory. With the connection of an appropriately wired cable, the ID-4801 can be used to emulate ROM in an external device.

Data can be transmitted and received between the Programmer and a computer through an RS-232C port. This port allows the transfer of data in an Intel hex format at a rate of 9600 baud.

The ID-4801 Programmer has a 4 x 4 hex keypad, which enables selection of any memory address in order to examine, delete, change, or enter data. Addresses can also be incremented or decremented. RAM can be searched to locate one or two data bytes and display both the data and the memory address.

The ID-4802 EPROM Programmer is equipped with a 2K x 8 system ROM and 2K x 8 system RAM that can be expanded up to 16K with optional expansion accessories. Extra personality module sockets and covers are also available as accessories. Six LEDs indicate function selections while six 7-segment LEDs display addresses, data, and prompts. Dimensions are 15¾" wide x 10¾" deep x 4¾" high. The Programmer weighs six lbs., and uses 120 VAC at 60 Hz, 16 watts maximum.

The kit costs $349.95 (shipping weight 11 lbs.). The Personality Module Accessory, containing five personality modules plus labels, (shipping weight 1 lb.) costs $14.95. An 8K RAM Expansion Accessory, containing additional RAM to expand the Programmer's memory up to 8 Kbytes, (shipping weight 1 lb.) costs $19.95. The 16K RAM Expansion Accessory, containing additional RAM to expand the programmer's memory up to 16 Kbytes, (shipping weight 1 lb.) costs $39.95 and requires previous installation of RAM Expansion Accessory.

For more information, contact Heath Company, Benton Harbor, MI 49022.

Byte Probe and Line-Voltage Monitor from Heath

Heath Company has introduced two new kits to its line of test instruments: a byte probe and a line-voltage monitor.

The ID-4804 Byte Probe is designed to aid in troubleshooting logic circuitry by displaying logic levels up to 10 MHz for any TTL or CMOS circuit that operates from a +5 volt DC supply. It also detects and alerts a user to a simultaneous occurrence of the same logic level on all eight input lines.

In addition, the probe may be used to trigger an oscilloscope or other test instrument. Several ID-4804s may be used in series to serve as an expanded version of the probe.

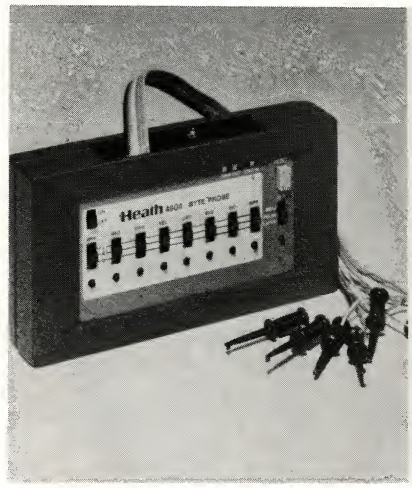
The ID-4804 is compact and portable. It can be powered by either a 9-volt transistor battery or an optional battery eliminator.

The IM-2203 line-voltage monitor measures and displays AC line voltages between 90 and 135 VAC at its electrical outlet. Its basic accuracy is within ± 1.5%. A fault indicator light goes on when the AC line voltage drops below a value set by the user. (This may be set anywhere between 90 and 120 VAC.) The light remains on until reset. AC voltages are displayed on LEDs.

The line-voltage monitor is designed to be useful both before installation of voltage-sensitive equipment, and after installation is already completed, when it will alert the user to potentially damaging line-voltage variations.

The IM-2203's case measures 3.7" high x 5.5" wide x 1.6" deep.

The byte-probe kit costs $69.95, and the line-voltage monitor costs $59.95. For more information about these two items, contact Heath Company, St. Joseph, MI 49085.



Breakout Box Isolates Problems with Interface Circuitry

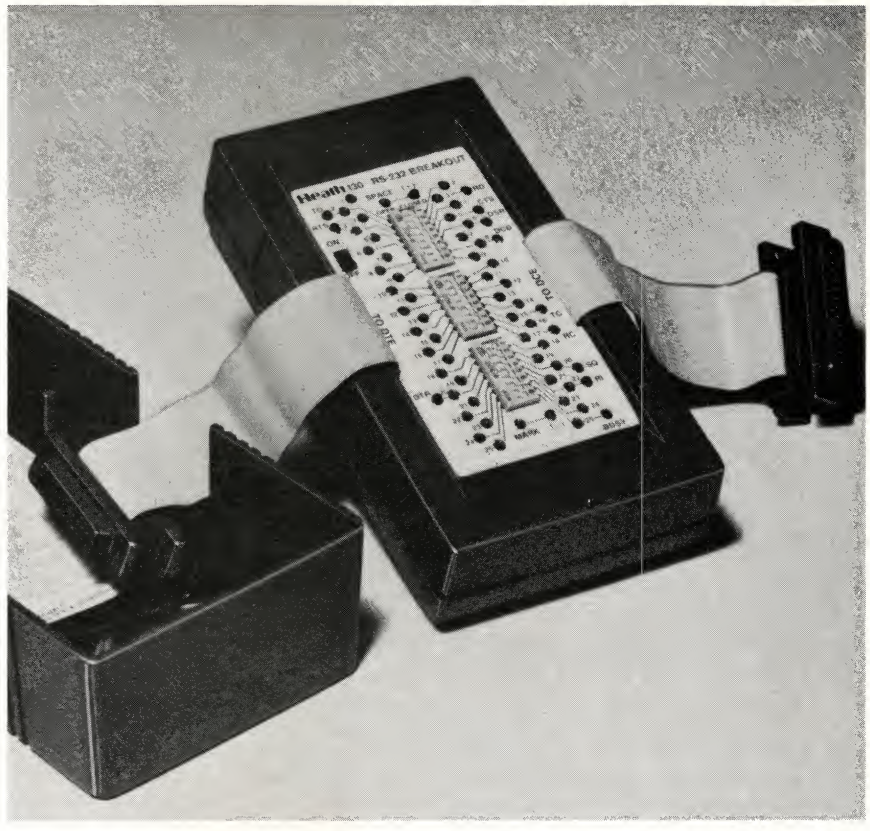
The Heath PMK-130 RS-232 Breakout Box is a device used to test and modify pieces of equipment which are interconnected by RS-232C standards. It is designed for use in computer servicing and peripheral design engineering.

The PMK-130 permits access to all 25 lines of interface circuitry and allows switch disabling of 23 lines, thus allowing for isolation or cross-connection of signal lines. Two flat cables with dual male/female 25-pin "D" connectors are provided to allow direct connection of the breakout box between two RS-232 devices including computers, printers, modems, and terminals.

Several key signal lines of the interface are monitored by twelve light-emitting diodes (LEDs) on the face of the breakout box.

The breakout box is 1⅜" high x 2¼" wide x 6¼" deep, and weighs less than one pound. It comes with a carrying case which lists common terms used with interfacing and provides storage for line jumpers. Two AA-size batteries are needed to power the PMK-130, but they are not included with the kit.

The kit costs $89.95. For more information, contact Heath Company, St. Joseph, MI 49085.



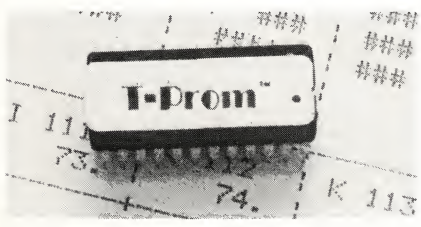
Improved Character Generator for H/Z89 and H/Z19

T-Prom is a character generator designed to enhance screen text characters on the H/Z89 computer and H/Z19 terminal. In all, 94 characters are modified for greater style, clarity, and boldness. With T-Prom, the user is given a choice between "stick" letters and "clear, stylish" screen text. For compatibility with games and graphics programs, original graphics characters are left unmodified.

T-Prom is a plug-in replacement for the original character generator ROM. It affects only the CRT display.

Installation instructions, operational tests, and display maps of text and graphic symbols are all included in the documentation. T-Prom is compatible with the H/Z89A and H/Z19A in addition to the '89 and '19.

The price of T-Prom, including shipping and documentation, is $19.95. T-Prom may be ordered from Norcom, 9630 Hayes, Overland Park, KS 66212.



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Scuttlebutt

Ford Motor Company has selected the Z171 as its "corporate standard" laptop computer, and has signed a contract with ZDS for 500 machines. John Frank, vice president of marketing at ZDS, said, "Ford has **taken the front seat** in recognizing and extending the full benefits of computers to its travelling employees." We hope they've fastened their seat belts.

The October 8 issue of *Computer Currents*, a Bay Area (Northern California) free newspaper, carried an interview with **George Morrow**, chairman and founder of Morrow, Inc. In it, Mr. Morrow speculated that if Morrow didn't get some financing before Zenith started manufacturing the Pivot II on their own, "then **I'm out on the street** along with a lot of other people."

Moody's Investors Service has **lowered the long-term senior debt rating** of Zenith Electronics Corp. to baa3 from baa1. They also cut the rating of Zenith's commercial paper from prime-3 to prime-2. They attributed the lower ratings to **Zenith's recent operating losses**, and speculated that "it will be difficult for Zenith to restore cash flow profit margins and fixed-charge coverages to previous levels," because of continuing highly competitive industry conditions in most of Zenith's major business segments.

Sextant readers who tune in to the **HUG bulletin board** on CompuServe may recognize **Joe Katz**, whose C column has its debut in this issue, as the man who came to the HUG SIG last spring for advice on a problem with **squirrels in his attic**. The latest report on this front is that the squirrels are long since gone, but the jokes just won't die.

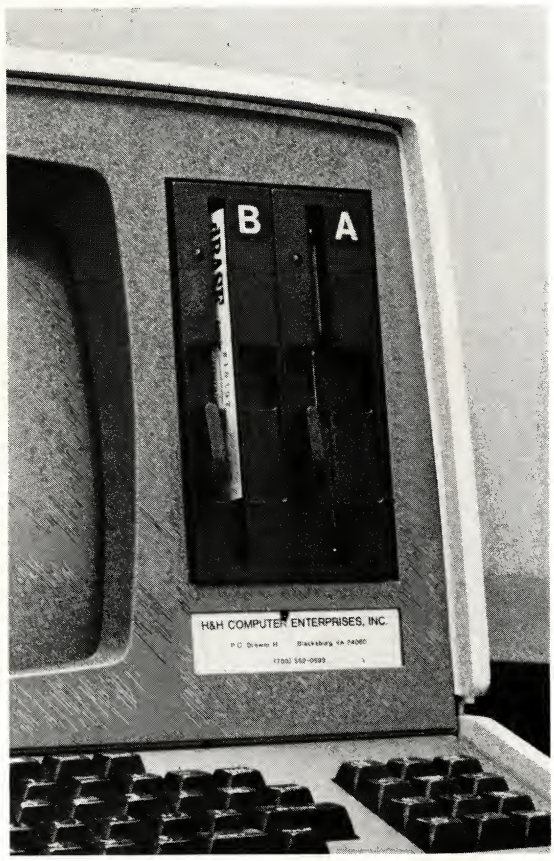
In real life, Joe Katz is an English professor at the University of South Carolina. He's working on a biography of Stephen Crane, and edited *The Portable Stephen Crane*, published by Viking–Penguin.

Is something happening to "the quality goes in before the name goes on"? A large purchaser of Z158s reports they're getting **10% of the machines dead on arrival**.

The two regional HUG conferences in November yielded several new computers for the staff of *Sextant*. As you may have read in this issue's Editorial Eye, Bryan Rutberg **carried away the major prize**—an H148—from CHUGCON. At the Western Regional HUG Conference, though, vendors weren't eligible for door prizes; so some of us who'd been holding out for a free computer **broke down and paid for one** instead.

Many people have been wishing for a Heath/Zenith **interface for a Bernoulli Box**. The latest Heathkit catalogue *does* list expansion boards and software to interface the IOMEGA Bernoulli Box with the H/Z89-90, '100, and '150. It's on page 99 of the Christmas catalogue.

St. Louis HUG is working with some people in the Air Force and at several colleges and large companies to arrange a **"Midwest Regional" HUG conference** this spring. △



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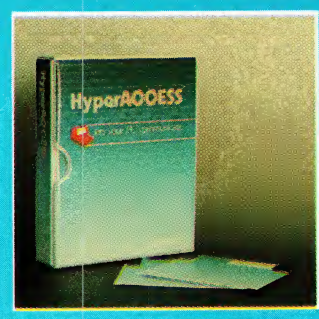

For PC-compatibles and Z-100 computers with DOS and any modem, including 2400 baud and USR S100 modems. You can get HyperACCESS for $149 from computer dealers or from Hilgraeve Inc. (please specify computer and add $5 shipping).

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